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# THE NATIONAL GEOGRAPHIC MAGAZINE

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IMMEDIATELY after the terrific eruption of the world's largest crater, Mt. Katmai, in Alaska, a National Geographic Society expedition was sent to make observations of this remarkable phenomenon. Four expeditions have followed and the extraordinary scientific data resulting given to the world. In this vicinity an eighth wonder of the world was discovered and explored—"The Valley of Ten Thousand Smokes," a vast area of steaming, spouting fissures. As a result of The Society's discoveries this area has been created a National Monument by proclamation of the President of the United States.

AT an expense of over $50,000 The Society sent a notable series of expeditions into Peru to investigate the traces of the Inca race. Their discoveries form a large share of our knowledge of a civilization waning when Pizarro first set foot in Peru.

THE Society also had the honor of subscribing a substantial sum to the expedition of Admiral Peary, who discovered the North Pole.

NOT long ago The Society granted $25,000, and in addition $75,000 was given by individual members to the Government when the congressional appropriation for the purpose was insufficient, and the finest of the giant sequoia trees of California were thereby saved for the American people.

THE Society is conducting extensive explorations and excavations in northwestern New Mexico, which was one of the most densely populated areas in North America before Columbus came, a region where prehistoric peoples lived in vast communal dwellings and whose customs, ceremonies, and name have been engulfed in an oblivion.

TO further the important study of solar radiation in relation to long-range weather forecastings, The Society has appropriated $60,000 to enable the Smithsonian Institution to establish a station for four years on Mt. Brukkaros, in Southwest Africa.

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# SEEING AMERICA WITH LINDBERGH

## The Record of a Tour of More Than 20,000 Miles by Airplane Through Forty-eight States on Schedule Time

By Lieutenant Donald E. Keyhoe, U. S. M. C. (Retired)

Department of Commerce Aide to Col. Charles A. Lindbergh

*With Illustrations from Photographs by the Author*

"WE'LL cover about twenty-two thousand miles," said Colonel Lindbergh, as he straightened up from the United States map on which he had drawn an endless zigzag line. "That includes 82 stops and flying over cities where we can't land. We can make it in about three months."

Milburn Kusterer, advance representative for the tour, glanced at the map and shook his head dismally.

"And I have to go all that way by train," he groaned. "I'll bet I'll never see a hotel bed once on the whole trip."

"You'll certainly have to move," replied Lindbergh with mock sympathy. "You ought to be traveling by air."

It was July 11, and only eight days remained before the start of the United States Tour for stimulating interest in commercial aviation. We had just completed the final plans and had had them approved by Mr. Harry F. Guggenheim, president of the Daniel Guggenheim Fund for the Promotion of Aëronautics, which was sponsoring the tour. We had decided on 68 overnight stops, at least one in each State. Shorter stays, which were designated as "touch stops," were included at 13 other places (see text, page 8).

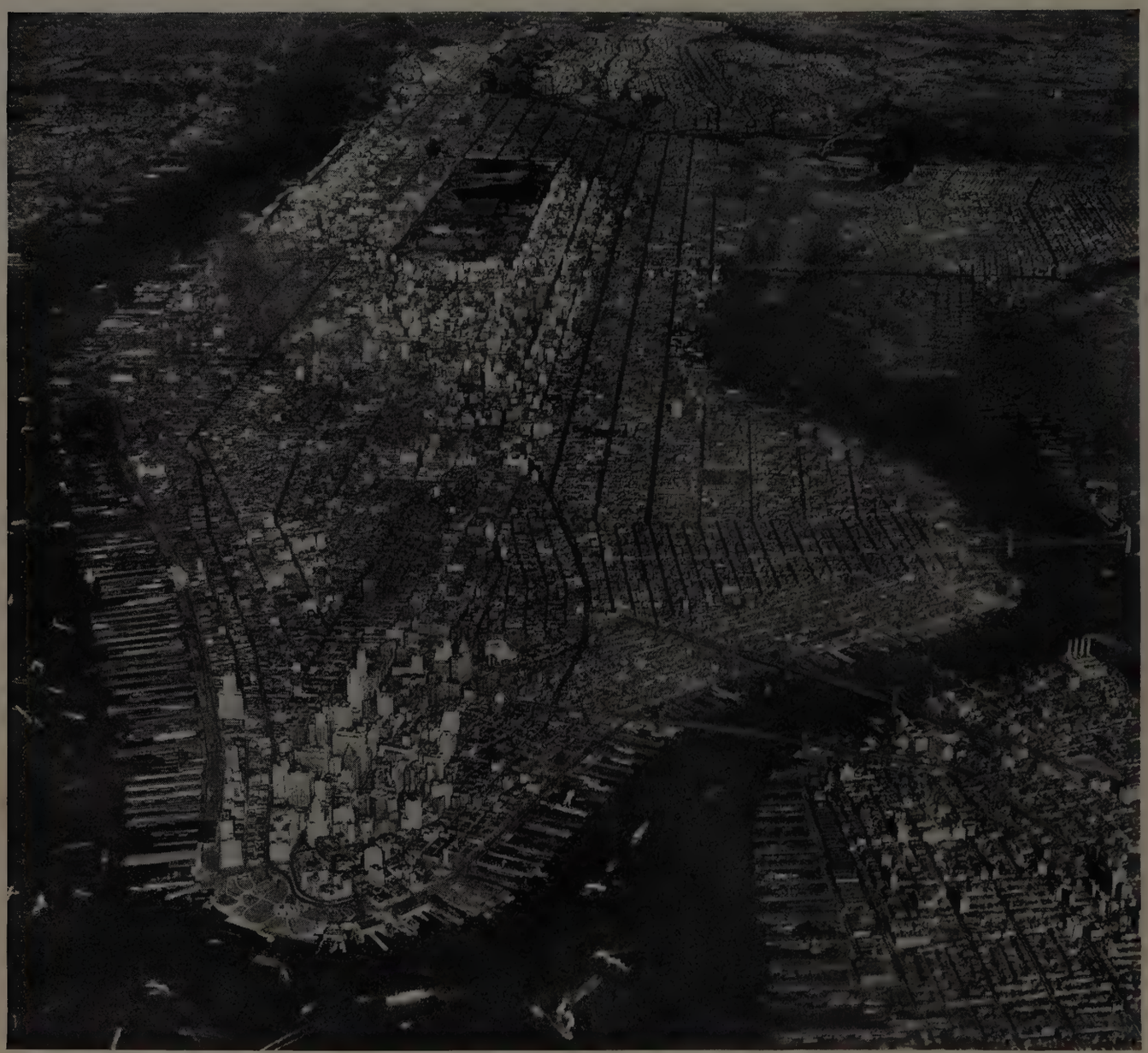
The arrival hour was to be exactly 2 o'clock at each city, for Colonel Lindbergh insisted that the most important consideration was to be on time. A standard program was outlined, regardless of the size of the place visited. Kusterer was to travel ahead of us and meet the reception committees, so that he could fit in this program with their plans.

Colonel Lindbergh was to use the *Spirit of St. Louis,* as it would be of much greater interest to the people because of its famous flight across the Atlantic. Making this long journey with the same ship and engine that performed this great feat would emphasize the safety and durability of modern aircraft.

### TWO PLANES READY FOR THE LONG TOUR

The Department of Commerce, through Assistant Secretary William P. MacCracken, Jr., of the Aëronautics Branch, had agreed to send along a plane that would precede the *Spirit of St. Louis* by a few minutes at each city. This ship was to be piloted by Philip R. Love, Aëronautics Inspector, and was to carry a mechanic and me.

Love had flown with Colonel Lindbergh during their Army training days and also



Photograph by Airmap Corporation

THREE HUNDRED SQUARE MILES OF NEW YORK CITY AND ENVIRONS SEEN FROM AN ELEVATION OF 12,000 FEET

A wonderful panoramic view of Greater New York, showing Manhattan Island, between the Hudson (left) and East River (right), with bridges (Brooklyn, Manhattan, Williamsburg, and Queensborough) to Brooklyn. To the right and near the top of the picture is Hell Gate Bridge (see, also, page 3). Beyond it, to the right, is Long Island Sound. The photograph shows the concentration of skyscrapers in three well-defined localities—the downtown, or financial, district at the south (lower end of Manhattan), the Fifth Avenue shopping district (center, south of Central Park, the oblong space in the background), and the Riverside Drive residential district, on the bank of the Hudson, in the northwest.

with him on the mail route between St. Louis and Chicago. My flight training had been in the Marine Corps, and I had been fortunate enough to be connected with the Byrd Polar Plane Tour sponsored by the Guggenheim Fund in 1926. The mechanic selected by the Wright Aëronautical Corporation was Theodore R. Sorenson.

By July 20th everything was ready. Kusterer had been given his week's start and another warning to travel fast. Each of the 82 cities had been notified of the date on which we would arrive. It was up to us to reach them on time and to return to New York on October 23, as scheduled. Both ships had been inspected and pronounced ready for their long aërial voyage across the continent.

## THE "SPIRIT OF ST. LOUIS" WAS STILL "BLIND"

At 12 o'clock Love, Sorenson, and I took off from Mitchel Field for Hartford, and the United States Tour was under way. Colonel Lindbergh followed soon after.

Photograph by Airmap Corporation

UNFAMILIAR NEW YORK FROM THE AIR

In the upper right corner is Manhattan Island, divided from Long Island (left) by the East River. In the foreground is the Bronx, from which the railroad tracks cross Randalls Island; then Wards Island and the famous Hell Gate Bridge to Long Island, from which they reach the Pennsylvania Station by recrossing the East River, this time by tube. The Hudson River and the Jersey shore are seen dimly through the haze at the top of the picture.

This first day was a good example of the standard program. We arrived at 1:45, which gave us 15 minutes to meet the reception committee and check the final arrangements. The most important detail was to have the field cleared. The *Spirit of St. Louis* was still "blind" because of the main gas tank up forward. Taxiing near the crowd would have been dangerous, as Colonel Lindbergh could not have seen any one directly ahead of him, and the whirling propeller could easily have caused a serious accident. For this reason we had to insist that the field be cleared and the hangar space vacant until his engine was shut off.

There was no difficulty at Hartford. The field was well policed and the *Spirit of St. Louis* landed without difficulty. After the open-air meeting, at which Colonel Lindbergh spoke on commercial aviation, he was driven slowly through the crowded streets, while thousands of people from Hartford and the surrounding country showed their regard for the man who had made the first lone "hop" across the Atlantic. The afternoon ceremonies were closed by a press interview.

### CITIES VISITED ASKED TO MARK THEIR ROOFS

The time between this and the banquet was supposed to be our rest period; but we had neglected one important matter: the arrangement of the schedule pushed our lunch hour forward to 5 o'clock in the

WAITING FOR THE "SPIRIT OF ST. LOUIS" AT PROVIDENCE, RHODE ISLAND

afternoon, and the rest of this time was taken up in attending to tour business and getting ready for dinner. The banquet began at 7 and ended at 9 o'clock.

The rest of the evening was devoted to planning the next day's flight. This had to be figured very carefully, as there were always requests from cities asking Colonel Lindbergh to circle over them. If they were near the course, he agreed on condition that they mark their roofs to guide aviators on cross-country flights. Such air-markings are helpful to pilots who are not familiar with the country. Without them, a pilot who is lost frequently has to dive down at a railroad station to read the name on the side. This is dangerous and should be entirely unnecessary.

When the day's route had been decided, the total distance was measured, and from this we figured the flying time. Half an hour was added to allow the advance plane time to arrive ahead of the *Spirit of St. Louis*. Two hours covered the time for dressing, breakfast, packing, driving to the airport, and warming up the engines. Subtracting this total from 2 o'clock gave the hour of arising, which was sometimes undesirably early.

On the second day we flew to Providence, landing at Quonset Point. The program here was carried out as at Hartford, and the next morning found us headed for Boston. Colonel Lindbergh received a great ovation at this historic city. The next morning we attended a breakfast in honor of Commander Byrd and the crew of the *America,* and Lieut. Lester J. Maitland and Lieut. Albert F. Hegenberger, of San Francisco-to-Honolulu fame.

### TAKING OFF FROM BOSTON IN DENSE FOG

When we reached the airport we experienced our first trouble. A dense fog covered the bay and the surrounding territory. When Colonel Lindbergh started his engine, there were protests at his flying when visibility was so poor. He went ahead with his preparations, however.

"Flying in this fog won't be so bad," he explained. "With these modern instruments, it is easy to fly indefinitely without seeing the ground or sky. All I am worried about is whether the airport at Portland is clear."

Drawn by A. H. Bumstead

THE ROUTE FOLLOWED BY THE "SPIRIT OF ST. LOUIS" AND ITS COMPANION PLANE

A new record for reliability and punctuality was established on this remarkable tour of more than 20 000 miles, over a period of three months, with stops at 82 cities and an overnight stay in each of the 48 States of the Union. Only once did the planes fail to keep their schedule, which called for a landing at 2 o'clock every afternoon in 68 places.

Official Photograph, U. S. Army Air Corps

THE ENVIRONS OF ALBANY, NEW YORK

This picture shows with great distinctness the irregular checkerboard effect of farms on which different crops have been planted. The experienced cross-country pilot is able to tell by a glance beneath him just what kind of a landing field any one of these spots would make. A field of standing corn presents a different appearance from one in which new wheat is growing. A plowed field is entirely distinct from one covered with sod. All of these things are quickly learned. The Hudson River is seen at the right.

Love nodded in confirmation of this.

"He's flown the mail on worse days than this," the latter said to me. "He knows what he is doing."

Colonel Lindbergh took off first, in order to fly over Lynn and Worcester on the way to Portland. Love wished to follow immediately, but he was doubtful about carrying anyone with him. Mail pilots are accustomed to flying alone in fog. In addition, his bank-and-turn indicator had not been working well. Finally, he decided to test this in a flight around the airport.

He had hardly taken off when the fog descended completely to the ground, so that he could not see to land. We heard him circling overhead for 20 minutes and then the sound of his engine died away. Sorenson and I, thinking he had gone to Portland, secured a State trooper and an automobile and headed for Maine at high speed.

Reaching Portland, we were glad to find that Love had landed safely in a small field near Biddeford. He had returned to Boston shortly after we had left and had taken off again. The fog had been so bad that he had flown clear across New Hampshire without once seeing the State.

Colonel Lindbergh had circled above Portland for more than three hours, trying to see through the dense fog, which covered almost all of the countryside. Knowing that the *Spirit of St. Louis* would not be safe at any place but the airport, he did not make an emergency landing, such as Love had done, but headed southwest and landed at Concord, New Hampshire, where he remained overnight, flying to Portland on Sunday. This was to have been a rest day, so we were back on schedule the next day, when we started for the official visit to Concord.

### MOST OF THE NATION'S FAMOUS SCENIC SPOTS SEEN FROM THE AIR

We had decided to fly over all the noted scenic spots of the country when such excursions would not delay the tour; so this morning we headed the ships north, into the White Mountains, at first flying together in close formation. Then we spread out and began to explore different parts of the range.

We remained in sight of each other until after circling Lake Winnepesaukee and Poland Springs. Here we separated, our advance plane going straight to Concord, while Colonel Lindbergh flew over one or two cities to drop messages, which were inclosed in canvas bags, with orange streamers to attract attention. The messages were as follows:

ABOARD "SPIRIT OF ST. LOUIS" ON TOUR

GREETINGS:

Because of the limited time and the extensive itinerary of the Tour of the United States now in progress to encourage popular interest in aëronautics, it is impossible for the *Spirit of St. Louis* to land in your city.

This message from the air, however, is sent you to express our sincere appreciation of your interest in the Tour and in the promotion and extension of commercial aëronautics in the United States.

We feel that we will be amply repaid for all our efforts if each and every citizen in the United States cherishes an interest in flying and gives his earnest support to the Air Mail Service and the establishment of airports and similar facilities. The concerted efforts of the citizens of the United States in this direction will result in America's taking its rightful place, within a very short time, as the world leader in commercial flying.

(Signed) CHARLES A. LINDBERGH.

HARRY F. GUGGENHEIM, *President,*
Daniel Guggenheim Fund for the Promotion of Aëronautics.

WILLIAM P. MACCRACKEN, JR.,
*Assistant Secretary for Aëronautics, Department of Commerce.*

From the start, the program had grown easier, as we became more used to it. At Concord and at most of the cities that followed, the ceremonies were about the same as at Hartford.

Between Concord and Springfield we explored the Green Mountains. Once or twice we surprised the inhabitants of some remote village, as we shot down over them. On the way to Albany we twisted around in the Catskills until heavy rainstorms sent us back on our course to the Hudson.

Lake George was the magnet that drew us the next day. We were scheduled for a touch stop at Schenectady, but we left Albany rather early and flew around this city on the way to Lake George. The short distance between Albany and Schenectady

A MOMENT OF RELAXATION IN CANADA

The punt in which Colonel Lindbergh and Philip Love are shown had just been shoved to one side by the occupants in the punt ahead of them. In the battle which followed, everyone in the party was in imminent danger of being ducked, but all escaped with minor injuries.

caused the people to expect us there within a few minutes, although we were not due until later. When we did not arrive it was reported that we had had an accident. This happened several times afterward in similar cases, for we did not announce our "sight-seeing" plans.

The Schenectady visit illustrates a touch stop. We did not leave the airport because of the short time at our disposal. Colonel Lindbergh gave a talk on aviation and made an opportunity for the crowd to see the *Spirit of St. Louis*.

From Schenectady to Syracuse was a fairly short flight. The next day we headed for Rochester, which was another touch stop. We had some extra time in going to Buffalo, so we flew over Niagara Falls. The wires near the brink kept us from getting a very close glimpse of the Falls, but we had a fairly good view of the famous cataract, from both the American and Canadian sides (see illustration, page 10).

Low clouds and a misty rain made visibility poor as we neared Buffalo and we had to detour around the city to be sure of not striking any buildings. There was no trouble in landing after we found the airport, which is one of the best in the United States.

Our first holiday began on the second day at Buffalo. We drove across the International Bridge into Canada, heading up toward Turkey Point, on Lake Erie (see illustrations above and on pages 9 and 11). Here we spent Saturday and Sunday fishing and swimming.

Although there were scores of other fishermen within a short distance of us, some of them less than 100 feet away, no one recognized Colonel Lindbergh as he leaned against a thwart and lazily dangled a line over the side of our boat.

Sunday night we returned to Buffalo, feeling quite refreshed and ready to go on with the tour. Kusterer, who had doubled back to compare notes with us, missed his

A CHANGE FROM THE ROUTINE OF BANQUETS

The aviators of the nation-encircling flight spent the week-end of July 30 near Turkey Point, Canada, on Lake Erie. This was one of the few times during the tour when Colonel Lindbergh was securely hidden from the thousands of enthusiastic admirers who always clamored to see him.

train on Sunday night and flew to Cleveland on Monday as a passenger in the advance plane.

### THE ADVANCE MAN GETS A RIDE AND A THRILL

Because of a slight delay in getting started, Love decided to fly straight down the shore of Lake Erie at a low altitude, so that he would not meet the head winds higher up. Two or three times, when we were rather close to the water, he purposely changed the altitude adjustment in the carburetor so that it created a lean mixture, making the engine sputter erratically.

Sorenson and I would pretend to get ready for a forced landing in the lake, advising Kusterer to get a life preserver and be prepared to jump just as we struck. When we arrived in Cleveland he swore he would never get in another ship with any member of the tour.

The police had difficulty in controlling the crowd at the Cleveland airport, but the ships were finally put under cover. After the official program, Colonel Lindbergh renewed his friendship with Ambassador Herrick and his family.

Next came Pittsburgh, with its scores of steel mills and foundries. From here we went to Wheeling, landing at Moundsville after a pleasant flight down the Ohio River.

The following day we flew across the more level State of Ohio to Dayton, the home of the Wright Brothers. After this we visited Cincinnati, flying once again across the Ohio River and circling the

Photograph by Airmap Corporation

THE "RIGHT TURN" OF THE NIAGARA RIVER AT THE FAMOUS FALLS

The American Fall, near the International Bridge, and the Canadian (Horseshoe) Fall, near the top of the picture, photographed from the air at an elevation of 2,000 feet. Goat Island divides the Falls into two parts.

Kentucky hills before landing. For some reason, this particular spot seemed to have an unusual attraction for Love, who left most regretfully on Monday morning when it was time to go on to Louisville.

Here we circled Churchill Downs, home of the famous Kentucky Derby. On the next flight we passed over a race track of a different kind, the automobile speedway of Indianapolis, where some of the most thrilling races in the world have been run. This speedway was familiar to me, as Floyd Bennett had landed the *Josephine Ford* in the center of it the year before. Now Indianapolis has a new airport, fully equipped and ready for extensive operations.

The tenth of August found us at Detroit. Before landing, we flew along the Canadian border for a view of the Detroit skyline, which makes a superb picture when viewed from a low altitude (see page 13). On the second day here Colonel Lindbergh invited Henry Ford to ride in the *Spirit of St. Louis*. This was Mr. Ford's first flight.

### LINDBERGH'S MOTHER TAKES HER FIRST RIDE IN THE "SPIRIT OF ST. LOUIS"

The next city visited was Grand Rapids. Colonel Lindbergh's mother made the trip from Detroit to this city in a three-engine metal plane and returned that night after the banquet. Mrs. Lindbergh is an en-

A DAY OF REST ON LAKE ERIE

On board the *Lightnin'*, owned by the aviators' week-end host, Colonel Lindbergh is seated between Philip Love, pilot of the advance plane, and Lieutenant Keyhoe (below and in front).

JUST BEFORE THE TAKE-OFF AT BUFFALO

There was a slight delay here. When changing oil some one had overlooked priming the craft's pump, so that there was no pressure when Colonel Lindbergh started the engine. He saw this at once and switched off the engine, signaling the mechanic to take down the pump. Although this priming required 45 minutes, it did not result in his being late at Cleveland. A time allowance was always made for just such an emergency.

GROUND FLYING

Over flat, uninhabited stretches of country like this, Colonel Lindbergh would often drop down within a very few feet of the ground, looking for some object of interest. The shadow of the plane shows that in this case he was about 30 feet above the prairie. Frequently he flew even lower, so that at times he appeared, from the plane above, to be landing. At such moments as this the air traveler gets a real impression of speed, when the ground flashes beneath him. Higher up, the plane seems to be hanging still in the air, although the speed may be just as great.

thusiastic advocate of flying and is entirely devoid of any fear of the air. During the afternoon at Grand Rapids, Colonel Lindbergh took her for her first flight in the *Spirit of St. Louis* (see pages 14 and 15).

The trip to Chicago was made across the lower end of Lake Michigan. As we passed across the water, scores of lake craft tooted their whistles as signals of welcome. We spent Sunday at Chicago as guests of Mr. MacCracken and his friends, and took off on Monday for St. Louis.

This was a familiar route to Colonel Lindbergh and Love. Both had carried the air mail on the Robertson contract route between these two cities. Love seemed to know everyone along the line. He spent most of the time circling farmhouses and waving greetings to those below.

We stopped for two hours at Springfield and made a visit to Lincoln's tomb, which advanced our arrival at St. Louis to the middle of the afternoon.

Our advance party was almost left behind on the day we were due at Kansas City. Some one had slept late, and the result was a rapid drive to the airport. The policemen who interrupted the drive refused to believe Love's story about the tour, and a jail seemed more likely to be our next stopping place. Finally, the display of all our baggage convinced them and we reached the airport in time.

## FUN IN THE AIR

The amount of our baggage always surprised reception committees. We carried four special suit bags containing three suits each, five hand bags, two brief cases, and a camera, besides a complete set of tools and spare parts. Almost all of this was transported in the advance plane. The *Spirit of St. Louis* could have carried this weight, but there was

Photograph by Kalec and Forster

THE CENTER OF THE AUTOMOTIVE INDUSTRY OF AMERICA MAY SOME DAY ENJOY SIMILAR DISTINCTION IN THE MANUFACTURE OF AIRPLANES

The reception accorded the United States Tour aviators at Detroit was one of the most enthusiastic of the entire itinerary. The Detroit skyline is here seen from Windsor, Canada.

MRS. LINDBERGH TAKES HER FIRST FLIGHT IN THE "SPIRIT OF ST. LOUIS"

Colonel Lindbergh's mother flew with her son long before he became famous, so that her first flight in the *Spirit of St. Louis* was no novelty, so far as the sensation of being in the air was concerned. Riding in this ship, however, could not but have thrilled her. The plane was designed to carry only one person, so that Mrs. Lindbergh had to sit upon the arm of her son's seat.

no baggage compartment, as all available space was taken up by gas tanks.

There was always an argument between Love and the rest of us about this baggage. He would go through the compartment, throwing out magazines, books, and pillows, which he claimed were unnecessary equipment. Sorenson and I maintained that the advance party should travel in comfort and peace.

An agreement to this effect was kept until Colonel Lindbergh heard of it. After this, whenever we were close together, he would fly straight ahead, so as to leave us in the disturbed air created by his propeller, with a result that we had a very bumpy ride for the next few seconds.

Love discovered that an unusual phenomenon would take place by suddenly pushing the control stick forward. Waiting until Sorenson and I were reading or asleep, he would push the stick ahead, thus causing the plane to nose down suddenly.

This maneuver made all the loose objects in the plane rise up in the air. Several times we found ourselves virtually floating up at the top of the cabin, in company with the camera and most of the baggage. After one or two hot arguments on this subject, we managed to persuade the practical joker that these tactics were unnecessary.

### AVOIDS AIRPORT TO SAVE CROWD

At Kansas City the crowd was lined up along the runway of the new airport. Colonel Lindbergh could have landed, but there was a slight chance that he might have swerved into the throng. The time was so limited that he picked a spot several hundred yards away and landed. Here and at Portland were the only two places where he did not land at the airport as scheduled.

JUST BEFORE TAKING OFF

The engine had been started and all was in readiness when this last picture was taken of Mrs. Lindbergh before making her flight in the *Spirit of St. Louis.* In a cabin plane of this type, it was not even necessary for her to remove her hat, nor to don any special flying clothes. Colonel Lindbergh is shown wearing goggles, but these are for use when he peers out of the windows in landing. Ordinarily, there is plenty of visibility in modern airplanes, but in this ship it was necessary to install a huge gasoline tank directly in front of the pilot's seat, making the plane "blind," so that unusual care had to be taken in landing and taxiing. This is one of the reasons the airports had to be so carefully cleared of people at each stop. The cylindrical object above Colonel Lindbergh's head is the magnetic compass. This is the same one by which he set his course for Paris. It is suspended so that he can see it by raising his eyes slightly. The compass may be read from the side as well as from the top. The rest of the instruments are on the board in front of him.

We left Kansas City next morning and went on to Wichita. Governor Ben S. Paulen, of Kansas, was a passenger in the advance plane. It was his first flight, but he was able to pick out all of the cities along the route. He directed Love toward his home town, and had no trouble in finding his residence from the air.

Our first early morning flight came at Wichita. We were scheduled to make a stop of one hour at St. Joseph, Missouri, and then to go on to Moline. There was some grumbling when we realized that we must get up at 3:30, but a good breakfast and a fine flying day soon put us in better spirits.

This part of the country is excellent for flying, as landings can be made at almost any point. We flew low over a great checkerboard of prosperous-looking farms (see illustration, page 20). Sometimes a few other early risers waved up at us.

The St. Joseph meeting was well conducted. We were sorry we could not stay longer, for this city has always been enthusiastic in supporting aviation.

### LOST, A MAP OF IOWA

Love had some difficulty in getting us to Moline, for he had lost his map of Iowa and had to fly across the entire State by guesswork. In spite of this,

HANGING IN THE AIR

When two planes fly side by side, as in this picture, each appears to the other to be hanging in the air without any movement except that of the propeller. This is true except in "bumpy" weather, when rising and falling air currents send the entire plane up or down or cause a wing to tilt slightly for a moment. Flying together in this way is always interesting, for pilots can signal each other and can carry on dumb-show conversation for long periods when there is nothing of particular interest to be seen below. Although the speed of the planes is not apparent when flying parallel, a slight touch on the rudder bar of either plane will cause it to shoot rapidly off to one side, so that within one or two seconds there will be a wide space between them.

we reached Moline at 1:30, exactly on schedule.

We left our ships at the Moline airport, but the official visit was paid to all four of the so-called Quad Cities—Moline, Davenport, Rock Island, and East Moline. We spent the night at the quarters of Col. David M. King, Commanding Officer of the Rock Island Arsenal, and before taking off for Milwaukee we inspected the arsenal buildings and shops.

At Milwaukee we again met Lieutenant Maitland and Lieutenant Hegenberger, who were flying east in a three-engine Army transport, the same type of ship they has used in flying to Honolulu.

From Milwaukee we turned west toward Madison, where Colonel Lindbergh attended the University of Wisconsin before taking up aviation.

On the way to Minneapolis we deviated from our course to fly over the headwaters of the Mississippi. It was strange to see the source of the stream which we had already seen farther south as a great river.

At Minneapolis the crowd proved too much for the police at the airport. Several thousand people broke through the line on to the field, as Colonel Lindbergh landed, so that he had to head for the nearest hangar to avoid running into them. He was supposed to use a hangar at the opposite end of the field, but he had no choice.

MRS. LINDBERGH MAKES A FLIGHT OVER FAMILIAR TERRITORY

The time lost in getting the plane under guard and clearing the field cut the period for the Minneapolis program in half. We had agreed to be at the St. Paul city limits at a certain hour, and of course we had to keep our agreement. For this reason our visit to Minneapolis was rather short and our passage through the city was rapid.

A CHANGE OF ELEMENTS

This was a dangerous moment for the photographer, whose shadow unfortunately fell upon the Colonel in this picture. A second later he was the target for a heavy shower of water, the third impromptu bath he had received in trying to get this scene. It was the author-photographer's plight which caused the amusement registered on the face of Assistant Secretary MacCracken, of the Department of Commerce, who was one of Colonel Lindbergh's hosts at Chicago, where this picture was taken.

We all regretted this, but it could not be helped.

At this point we lost one of our party. Sorenson was recalled by the Wright Corporation and C. C. Maidment was assigned to take up his work.

After a rest day at St. Paul we left for Little Falls, Minnesota. Colonel Lindbergh's mother also made this flight as a passenger in the advance plane. This was familiar country to her, as she had flown over it several times with her son. She pointed out many landmarks which she recognized from the air.

From Fargo, North Dakota, which was our next stop, we turned south for a time. There was a short visit at Sioux Falls, and then we went on to Sioux City, Iowa. Here the committee had arranged the program so smoothly that it was completed ahead of time. The citizens and visitors from neighboring communities evidently had expected the delay which is sometimes a part of public ceremonies. At any rate, many of them missed the parade and it was necessary to make a second one.

The next two flights were over the great Iowa corn belt, from Sioux City to Des Moines and on to Omaha. Love had found his map of Iowa by this time, so that he did not have to fly down and read the names on the railroad stations.

After this we began a series of longer jumps. On the hop from Omaha to Denver, Colonel Lindbergh flew about 590 miles. This was slightly more than the advance plane covered, as he had to fly over five or six cities which were not on the course.

September 1 had been scheduled a rest day. We decided to use it for making a flight to Pierre, South Dakota, as there had been only one short visit in this State.

A HERD OF RANGE HORSES ENCOUNTERED IN THE BAD LANDS

As we left Denver we circled around Longs Peak, and then past Estes Park and

ST. LOUIS, CHILD OF THE FATHER OF WATERS

Up the Mississippi, long ago, came the French fur traders to found the trading post that became St. Louis. Now this mighty city, with its 22 railroads, its river traffic, and its net of motor highways, ranks among the great manufacturing and exporting centers of the world. And, curiously enough, its fur trade is bigger and brisker than ever—in fact, St. Louis is now the world's greatest raw fur market. Colonel Lindbergh's plane appropriately bears the name of this splendid metropolis in the heart of the Nation.

the Colorado National Forest. We followed a straight course across Nebraska, and the plains of that State were soon left behind. Passing over the border of South Dakota, we came upon the Pine Ridge Indian Reservation, and dropped down to view these descendants of the first Americans. A little bit later the Bad Lands came into sight.

As we came up on to a plateau we were surprised to find a herd of range horses. This was many miles from the nearest habitation we had observed. Quite evidently these horses had never seen an airplane before. As we swooped down to look at them, they separated and dashed away terror-stricken.

We followed a few of them clear down into the bottom of the Bad Lands.

We found another herd before reaching Pierre and attempted to get some pictures. This was very difficult, as the plane was

Official Photograph, U. S. Army Air Corps

ST. PAUL, MINNESOTA, FROM THE AIR

This was one of the few places where some difficulty was experienced on the United States Tour. When landing at the Minneapolis airport Colonel Lindbergh was forced to taxi hastily into a hangar at one side to avoid the huge crowd, which had broken through the police lines and was rushing out on to the field. Because of this the period which would have been available for the program at Minneapolis was reduced to half an hour, so that it was necessary to make a rapid passage through the city instead of a more leisurely parade, which had been planned (see text, page 16).

moving rapidly and the horses would swerve in the other direction when we got down near them (see illustration, page, 22).

### A MESSAGE DROPPED AT THE SUMMER WHITE HOUSE

We took off from Pierre early the next morning and followed a straight course to the President's summer home, near Rapid City. Colonel Lindbergh came down low and dropped a message which we found later was delivered to Mrs. Coolidge. There were several people grouped on the steps, but he could not recognize them because of the speed in passing.

The advance plane was forced to stay at a higher altitude because of its heavy load. We could not gain altitude quickly and might have had trouble in getting out of the pass.

From the Summer White House we went on past the Black Hills, Sheep Mountain, Harney Peak, Rapid City, and Deadwood. From Custer, near Wind Cave National Park, we crossed over the border into Wyoming. From here we followed a fairly straight course past Fort Laramie into Cheyenne.

### WHEN A MAP BECOMES ALIVE

Reading the map on such a flight as this is an interesting game. There was always something to be seen. The cross-country pilot becomes used to seeing his map take life in the country that passes below him. Only from the air can a traveler get this feeling of having the earth moved by for his inspection. He glances at the map and sees a mountain range indicated at a point eighty miles ahead. At the moment there is only a level prairie beneath him, but within a few minutes a bluish haze shows on the horizon. This is the mountain range, still more than 50 miles away.

To check his location he looks again at

FLYING OVER A CHECKERBOARD OF FARMS

From an altitude of 2,000 feet or higher, farming lands present a huge checkerboard appearance. Sometimes the units are irregular in shape, but in many places, as in the Middle West, they are extremely uniform. In this picture Colonel Lindbergh had just surprised the occupants of the advance plane by shooting by at high speed when they did not know that he was within miles of them. He had deviated to fly over a city and caught up with them unexpectedly. His ability to do this demonstrates his accurate knowledge of air navigation, for in each case he had to figure a problem considering both the ships' speed and the location at the last time they were together. The slight tilt of the wings was caused by the right turn in which the *Spirit of St. Louis* was swinging. The white triangle at the upper left of the picture is a highway which formed one of the many landmarks used in flying cross-country.

the map. There should be a river running diagonally across the course 15 miles farther on. Ten minutes elapse and the river is directly below. It twists through the foothills just as the black line twists across the map in his hand.

Cruising back and forth in this way, the flight to Cheyenne seemed short, although it took more than six hours. We were soon down on the ground again, meeting the reception committee and starting upon another program.

Several desired deviations from the course to Salt Lake City made us start

Official Photograph, U. S. Army Air Corps

THE STATE CAPITOL AT DENVER, COLORADO

After circling over the dome on leaving Denver, Colonel Lindbergh climbed up higher for a close view of Longs Peak. From here he went on past the Rocky Mountain National Park and Estes Park.

early. We did not fly the air-mail route, but headed south over Clarks Peak, Steamboat Springs, and Craig, Colorado. Farther on, we flew over Strawberry Peak and Provo, Utah.

### GREAT SALT LAKE APPEARS IN MINIATURE

We came over the mountain range at a high altitude, from which Great Salt Lake and Salt Lake City seemed to have been constructed in miniature. We descended slowly and watched the old city of the Mormons take form beneath us. The great Tabernacle stood out distinctly. Several miles to the west we saw a terraced ledge and came down to look at it. We found that this was the Bingham Copper Mine. A dozen trains moved back and forth on these ledges with their loads of ore.

The trip from Salt Lake City to Boise, Idaho, took us over Great Salt Lake, with its railroad causeway extending completely across from east to west. We flew at a low altitude, but saw only a solitary boat off to one side.

Our course for Butte lay over the Sawtooth Range and the Salmon River. The Sawtooth Mountains live up to their name, as they rise to very sharp peaks for miles and miles.

There were many picturesque scenes along this range. At one spot we saw a deep hollow in the side of a mountain, rounded as if it had been turned out in a huge lathe, except where it had been broken at one side. The bottom was constantly in shadow because of the overhanging rim. There was a layer of snow at one side, though this was below the point where snow would usually be found (see illustration, page 25).

### EMERGENCY RATIONS CARRIED ON FLIGHTS OVER MOUNTAINS

In all our flights over mountainous or sparsely settled country we carried emergency rations and canteens of water. We did not expect any trouble from our engines, but we were prepared for forced landings. Even in the worst of the mountainous country, we saw many places

RANGE HORSES IN SOUTH DAKOTA GET THEIR FIRST VIEW OF A PLANE

Far out, near the Bad Lands of South Dakota, the two planes came across a herd of range horses. Apparently they had never seen an airplane, for they showed the greatest fright as the aviators swooped down for a close view. The few domestic horses seen on the tour in the eastern part of the country did not display such terror as these range horses showed.

where we probably could have landed without injury to ourselves.

We did not carry parachutes, for there was no need for them. Parachutes are valuable for experimental, military, and air-mail flying. In such operations, pilots work under all kinds of conditions. In commercial flying, of which our tour was an example, parachutes would have been a detriment as added weight.

### "DAYS OF REST" SPENT IN FLYING

Our arrival at Butte was to have been the beginning of a vacation, but we decided to take one day of this period for a visit to Helena. We also decided to make long deviations on the flights to and from Helena, but we did not announce this.

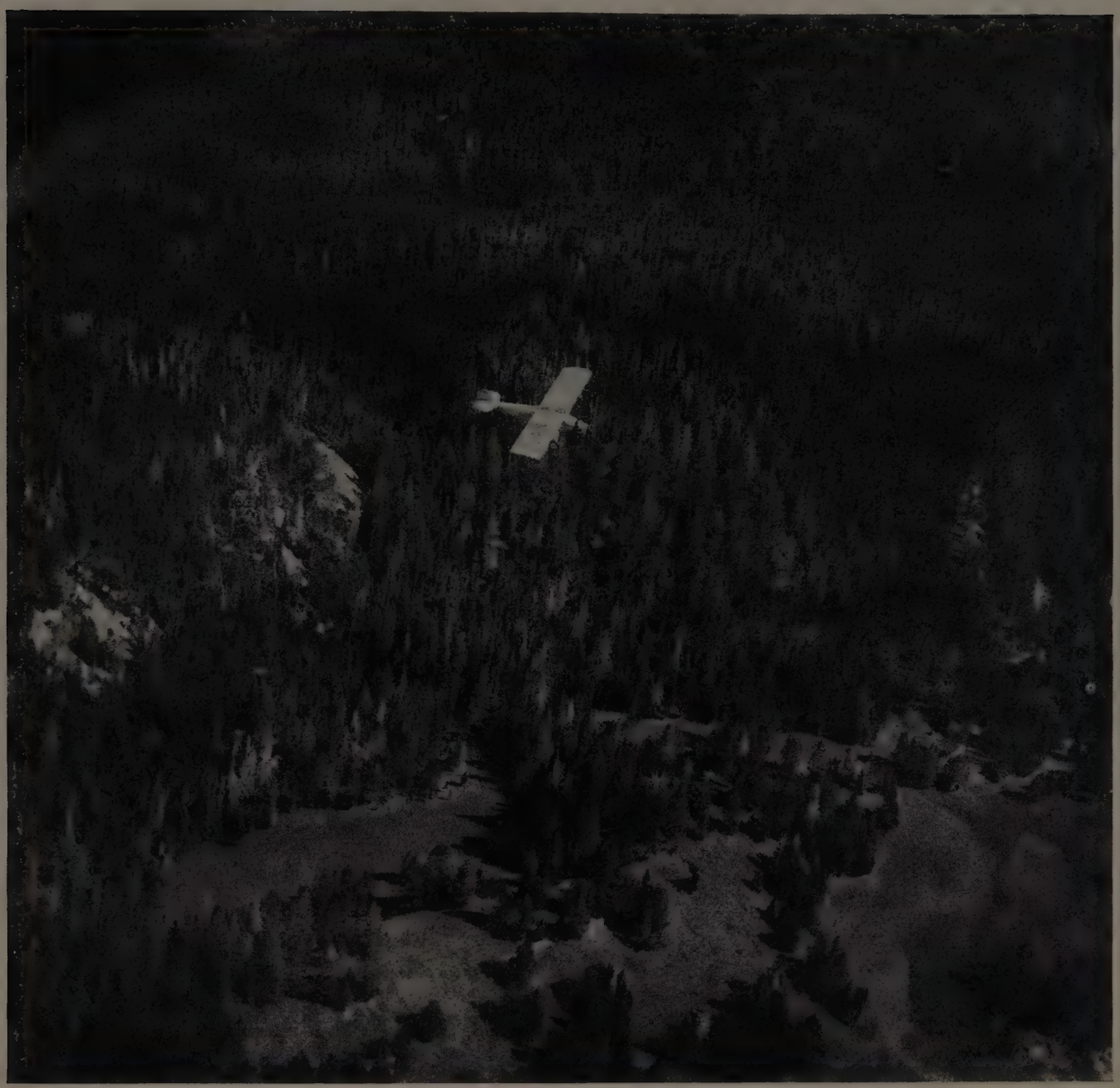
Glacier National Park was the reason for the first change of course. We reached the park after flying over Swan Lake, Mission Range, and Flathead Range.

This journey over Glacier Park was well worth the effort of the entire tour. One snow-capped peak after another sent us circling about it in admiration. Once we broke through a patchy layer of clouds and flew above it in the sunlight. Here and there a higher mountain projected through like an island at sea (see illustration, page 26).

Cruising leisurely, we saw practically all of Glacier Park in a few hours. It would take months, and perhaps years, to cover it, using any other method of transportation. Even then it would not be so satisfactory, for if we wished a better view we had only to climb higher or to fly around at a different angle.

Regretfully, we left the park and flew back over Mount Slyen and Mount Cleveland. We also saw the Blackfeet Reservation and circled over Great Falls. A strong wind was blowing as we turned toward Helena. We had to run our engines at nearly full throttle to arrive on time.

There were several inquiries as to what had happened to us between Butte and Helena. The distance is only about 80 miles and we had taken six and a half hours to get there. We explained vaguely that we had been circling around. We



FLYING OVER THE BLACK HILLS OF SOUTH DAKOTA

On the way from Pierre, South Dakota, to Cheyenne, Colonel Lindbergh deviated from his course in order to fly over President Coolidge's Summer White House, near Rapid City. This took him over the heavily wooded slopes of the Black Hills. Over territory of this kind the modern aircraft engine proves its worth, for pilots now have little fear of forced landings.

were afraid some one might try to dissuade us from flying over Yellowstone the next day.

### A VISIT TO THE WONDERS OF YELLOWSTONE NATIONAL PARK

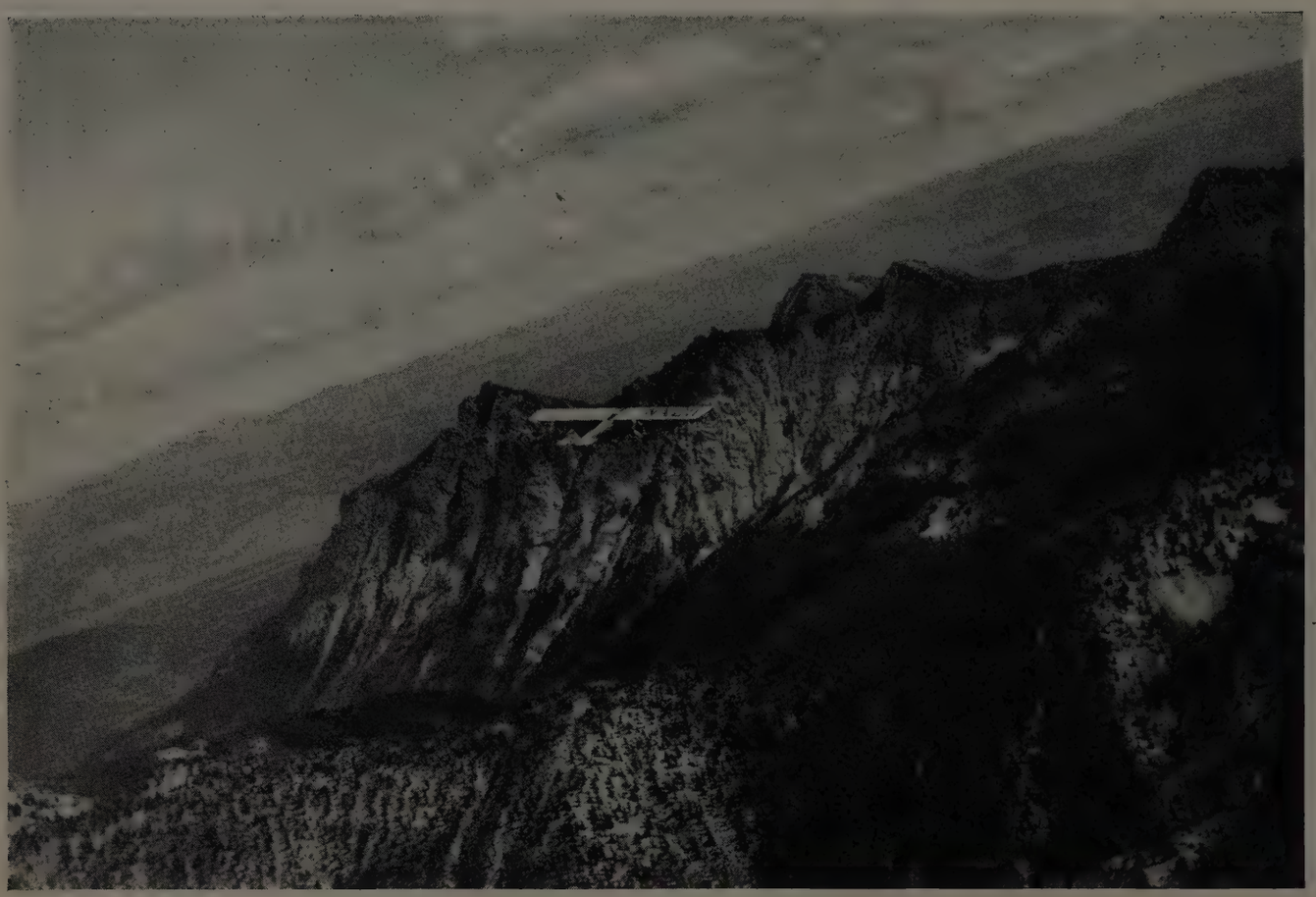
The next morning we again took off early, with the famous Yellowstone National Park as our objective.

On the way across the Montana plains we saw herds of sheep and came down rather low to wave at the herdsman. The effect was not what we had expected. The sheep became alarmed and closed in from all sides. In a few seconds they had wound themselves into a huge spiral, which became tighter as each one tried to get near the center (see illustrations, page 29).

The herdsman stood shaking his fist at us. We did not seem to be welcome visitors, so we zoomed up from the milling sheep and went on.

On the way to Yellowstone Park we passed by the Big Belt Mountains, Crazy Mountains, and the Cayuse Hills. We also circled Billings before heading westward again.

While still in the plain country we saw a group of curious formations. They were



EXPLORING THE COUNTRY A LITTLE OFF THE BEATEN PATH

There is no "beaten path" in the air, of course, but between certain cities flyers usually pass over the same territory in regular flights. Many times, as in this instance between Cheyenne and Salt Lake City, the aviators deviated to explore the less visited sections, or to get a glimpse of a desolate stretch that offered some added interest. Apparently, there was no landing place, if such a spot had been needed at this point. In reality, however, there was an almost flat area to the right, just off from the ridge shown in the foreground. The plane could have been banked into a turn and have made this ground safely. To the left of the mountain ahead of the ship may be seen a perfectly flat stretch which could also be used, if an intermediate field were desired in this part of the country for regular operations.

apparently rocks, but from a little distance they looked like huge batches of dough dropped close together. There was no connection between them. They appeared to be resting upon the ground rather than to be a part of it. We found later they were sandstone towers, eroded to their present shape in centuries of time (see illustration, page 27).

IN CLOSE QUARTERS FLYING THROUGH A MOUNTAIN PASS

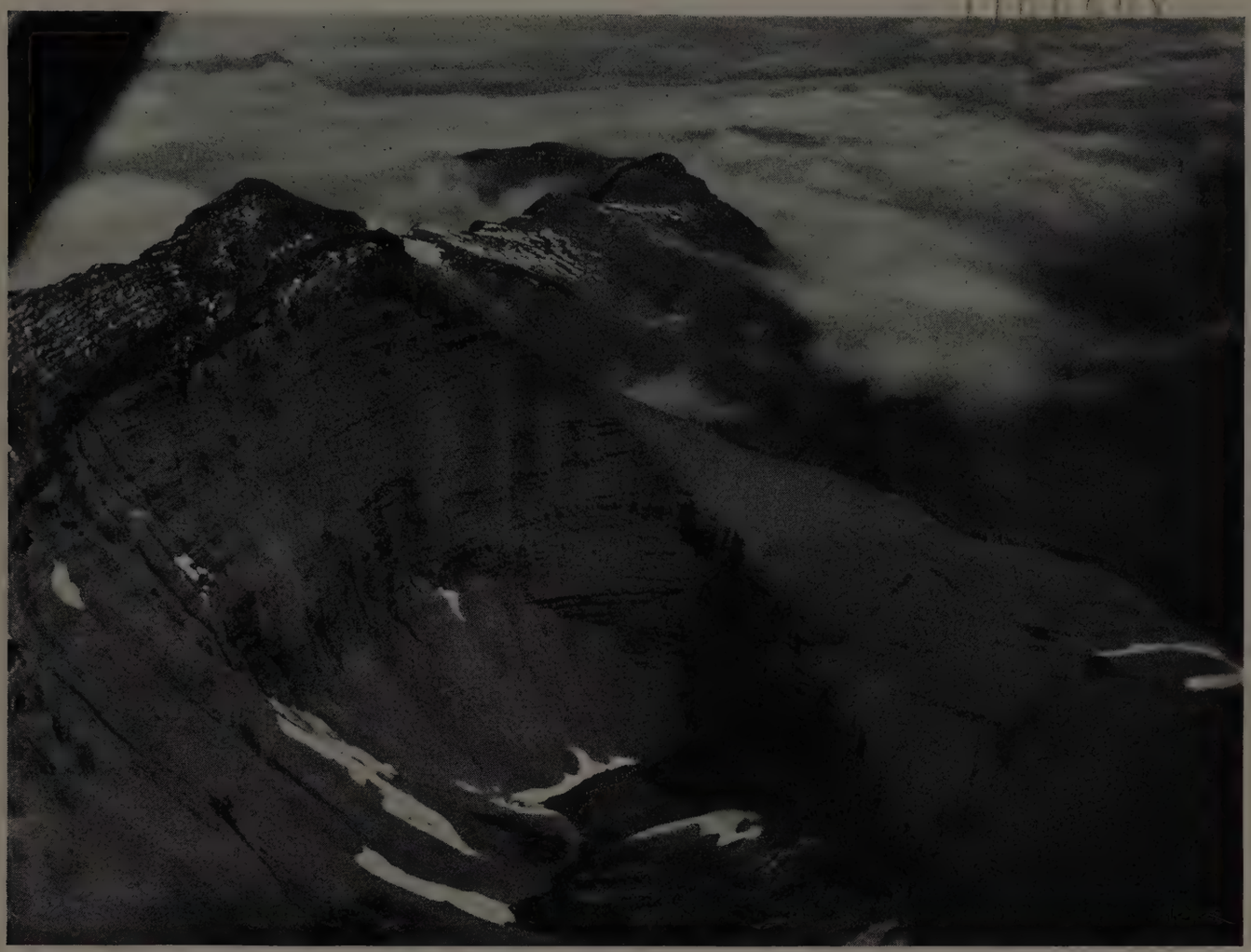
We had some trouble in getting through the clouds that blocked most of the mountain passes to the south. At last we made it, although the two planes were separated for a time. We came together again over Yellowstone Lake and flew close to the surface until we reached the shore near Old Faithful Geyser. We had hoped to find it in action, but we were too early. The gas supply in the advance plane was running low; so, after an inspection of other geysers we went on our way.

It was now late in the afternoon, so we headed straight for Butte. Soon we found it was not so easy to get there. Heavy clouds extended down into the passes, so that we had to fly within 100 feet of the ground to get through. This was not so bad, except in case the pass became "blind"—that is, choked with clouds.

In such a case, to avoid flying through without any knowledge of what was ahead, with the possibility of crashing into a mountain side, we should have had to turn about at once. In such close quarters this would have been hard for the two planes to do at the same time.

Luckily, the pass stayed clear and we came out on the other side to find ourselves nearly leveled off for the landing at Butte.

Kusterer had retraced his steps to Butte to take part in our vacation. He was the



AMONG THE CLOUDS IN GLACIER NATIONAL PARK

The lure of this beautiful mountain range proved too much for the flying-around-the-country party. On the flight between Butte and Helena, ordinarily covered in about an hour, they deviated far to the north, spending two or three hours circling over the park. This particular spot is a craterlike hollow, one side of which has been broken away. At the upper left the top of another mountain can be seen projecting through the clouds like an island.

first to greet us. I noticed that he had a very worried look.

"You'll have to get another advance man," he said, shaking his head. "I can't stand this much longer. You've been reported cracked up all the way between here and Helena. Where have you been for the last five hours, anyway?"

"Waiting for Old Faithful to spout," we told him.

"But Yellowstone is 250 miles from here," he objected. "What were you doing way down there?"

"It was only a little bit off the course," Love said, with a grin.

Kusterer winked at the rest of us. "I guess the next thing you'll be saying Cincinnati is on the route between here and Spokane," he remarked.

Love subsided at this, for Cincinnati still seemed to hold an unusual attraction for him.

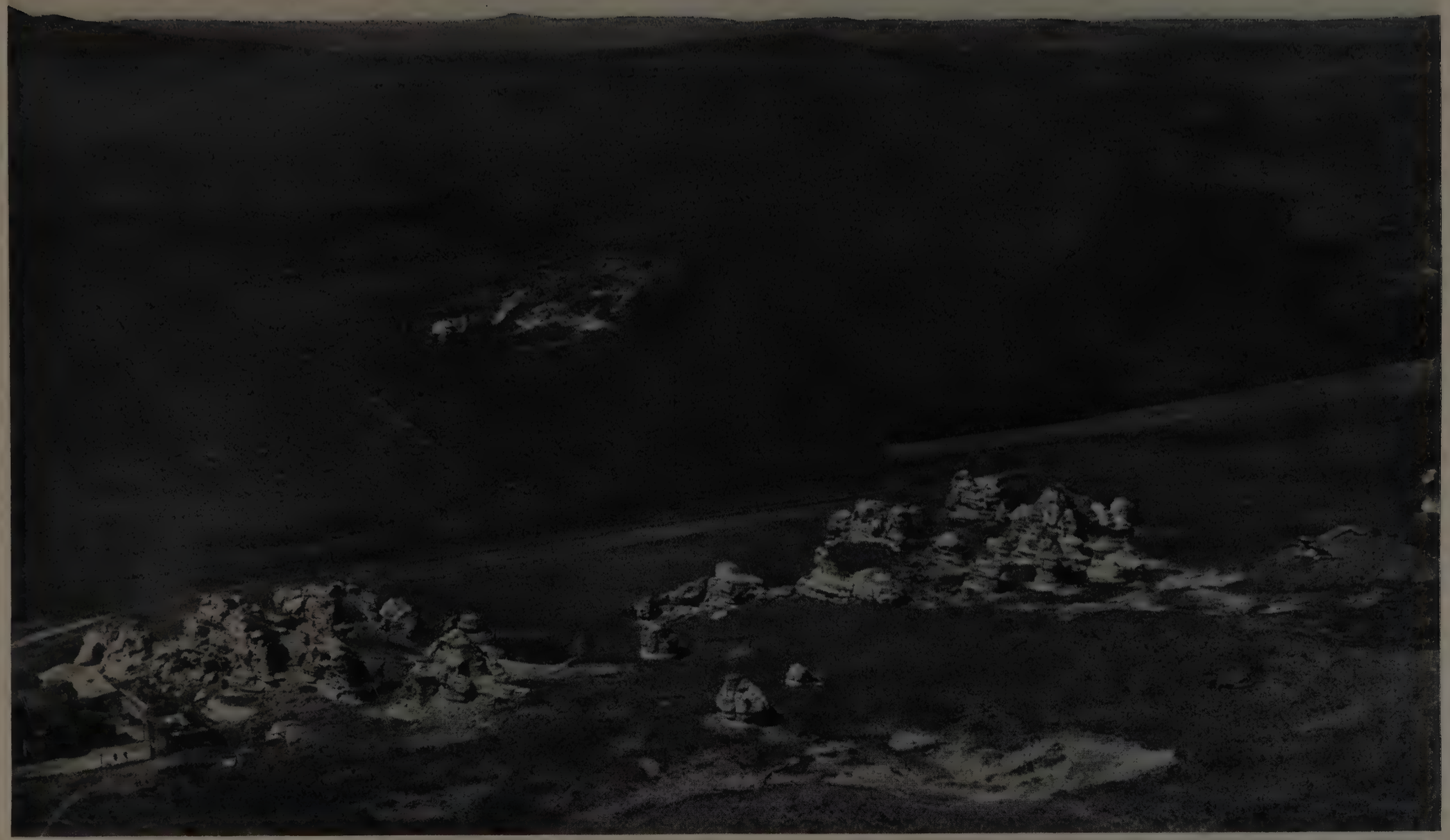
That night we had an opportunity to visit a copper mine. In company with our hosts at Butte, we were swiftly dropped to the 2,800-foot level of the mine. A very interesting hour was spent watching the miners drill holes for the dynamite charges, exploring the different lateral shafts and listening to explanations of the methods used.

### "SNIPE" AND "BEAR HUNTING" IN MONTANA

A rest from the series of programs began the next morning. Love and Maidment decided to stay at Butte to work on the planes. The rest of the party went up to a camp on Elbow Lake, where we were the guests of Mr. John D. Ryan. With Mr. Carlos Ryan, Mr. John Hobbs, and others we spent the time shooting, fishing, and thinking up tricks on some one of the outfit.

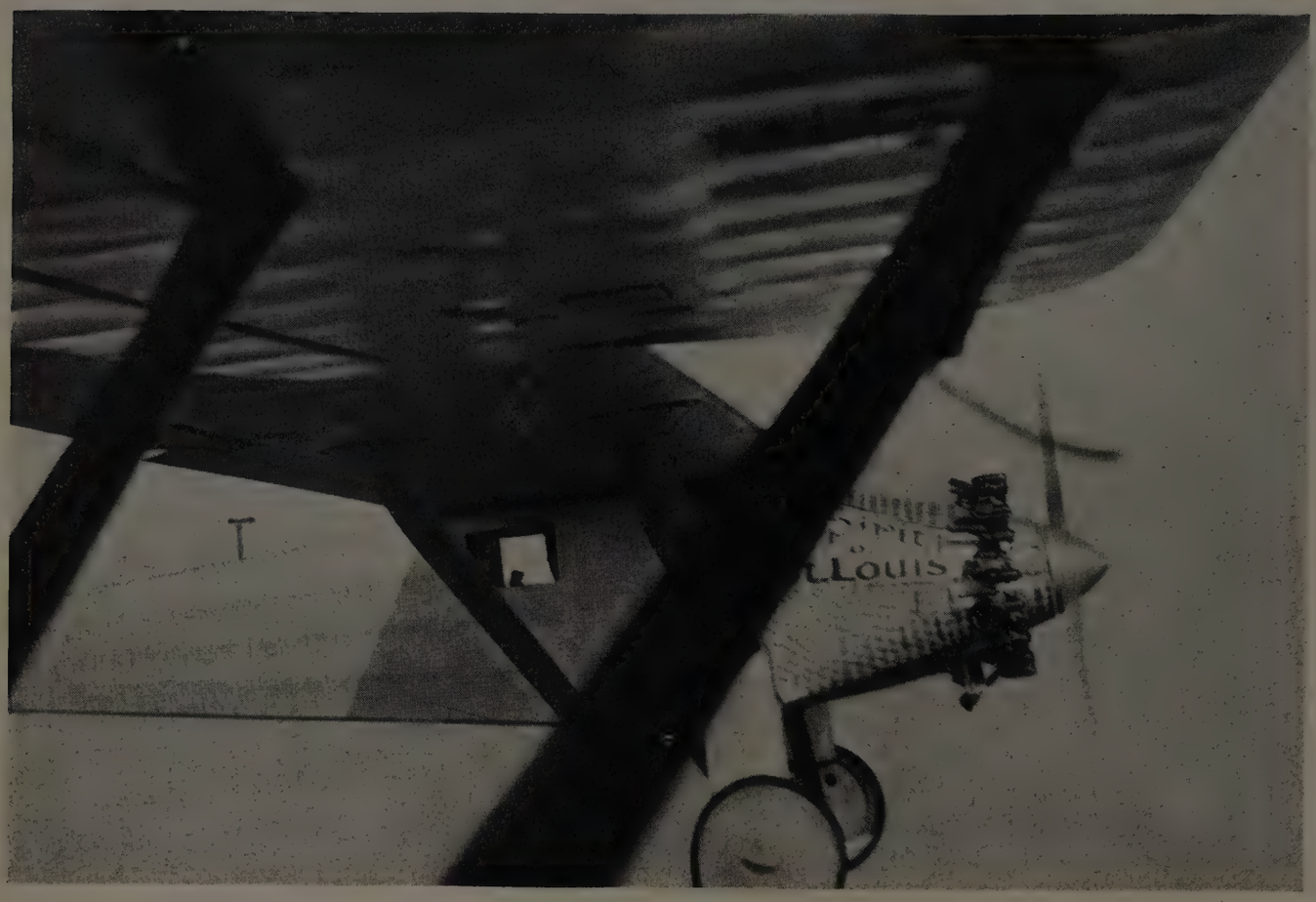
IN THE LAND OF CLOUDS AND ROCKS AND SNOW

Flying among the peaks in Glacier National Park was not difficult on this day because of the scarcity of clouds. If there had been a heavy cloud layer, the planes would have been forced to fly high, as otherwise there would have been great danger of striking a mountain hidden among these fleecy masses. There were very few snow-capped peaks at this point, although here and there, in the shadow of the range, patches of snow were found.



LOOKING DOWN UPON SANDSTONE TOWERS BETWEEN BUTTE AND HELENA, MONTANA

These rock formations, which from the air resemble bits of biscuit dough, have acquired their fantastic appearance through weathering and erosion. They are one evidence that this part of the country was not glaciated, since the great ice masses scoured away such obstructions. The ranch house, built close up against these rocks, seeks protection from the biting winds that blow in this nearly treeless region.



FLYING WING TO WING

The picture was taken just as the *Spirit of St. Louis* overtook the advance plane. Projecting above the window ledge of the former is the map which Colonel Lindbergh was using to guide him across this part of the country. The T-shaped projection above the fuselage is the wind vane of the earth induction compass which guided the ship to Paris. Although the propeller seems to have stopped still, it was moving at the rate of about 1,500 revolutions per minute when the picture was taken.

We found that one member of the tour party had never heard of a snipe hunt. We explained the details to him very carefully. That night found him sitting beside an open sack out in the thickest woods, a lantern beside him, and in his hand a large bell, which he rang continuously to attract the wary snipe.

The rest of the party had left him with the understanding that they would go out and drive in the snipe. After an hour or two the victim began to suspect that all was not well, for no snipe had shown up. After getting lost on his way back, he finally reached the camp and found every one comfortably seated around the fire.

The snipe hunter took this so good-naturedly that a more elaborate stunt was planned for his benefit. Early in the morning a loud yell came from the cook tent. The guides ran over hastily. The cook pointed to a torn spot on a quarter of beef hanging from the ridgepole. By this time the intended victim had arrived. The cook explained the trouble with many gestures.

"Bear!" he exclaimed. "He was right in here, clawin' at that beef, when I woke up."

Bear tracks were found outside the tent, leading away into the woods. Charley, one of the guides, nodded to himself.

"He's a big one," he said to the cook. "You keep your eyes open and give me a yell if he comes in again."

The cook snorted.

"I'm not goin' to sleep in that tent," he declared. "No bear is gettin' that close to me again."

"What are you going to do?" the snipe hunter asked the guide.

"I'm going to get that bear," was the reply. "He'll be in here again after dark to-night."

The visitor begged to be taken on the hunt. Charley at first refused, but at last gave in on condition that the other man would not carry a gun.

AN UNEXPECTED GAME OF "RUN, SHEEP, RUN"

While flying over Montana a herd of sheep was seen below. Colonel Lindbergh dropped down to see them. The effect was somewhat surprising. The sheep became panic-stricken and closed in from all sides with utmost speed. In a few seconds they had formed a tight spiral, each sheep trying its best to get into the center (see text, page 23).

NOTE THE ANGRY SHEPHERD IN THE UPPER LEFT CORNER

For once Colonel Lindbergh did not seem to be such a welcome visitor, for the herdsman stood shaking his fist violently at the *Spirit of St. Louis*. After circling to the other side of the herd and driving it back toward the herdsman, Colonel Lindbergh zoomed upward and went on.

ONE OF LINDBERGH'S FOLLOWERS

Master Billy Howard, of 636 Brooks Street, Missoula, Montana, won first prize with his flower airplane in a pageant at this northwestern city. He is only one of the hundreds of thousands in the United States who dream of following Lindbergh through the skies. The letters received from these youngsters all express the hope that they, too, will some day be famous flyers.

"You might get excited and take me for the bear," he explained. "We don't want anybody getting shot up here."

That night the whole party was gathered around the fire when a slight commotion sounded from the direction of the cook tent. A few seconds later the guide ran up and signaled the erstwhile snipe hunter. Together they disappeared into the darkness of the woods.

In a minute or two a shout was heard. Then came a couple of shots. After this we heard a louder yell. It was Charley's voice.

"The gun's jammed! Follow me, we've got to run for it."

The sound of this had hardly died away when we heard some one dashing along the trail. Past us went the would-be bear hunter, straight for the gun tent.

"Got to help Charley," he gasped. "Poor fellow, he couldn't run fast enough."

Just then Charley himself appeared, rather out of breath.

"Say, that fellow doesn't need any wings to fly," he wheezed. "He's an airplane all by himself."

"Shorty" Lynch, Colonel Lindbergh's former flying partner, was the last one to be a victim. Some one found him dozing on his cot, fully dressed. A noose was laid around one of his boots and the end of the line was thrown over the ridgepole. At a signal he was jerked abruptly from his sleep and drawn skyward. His shoulders remained on the cot, but his efforts to release himself were useless. He remained in this position for 15 minutes, while all members of the camp were invited to make an inspection. After he had been photographed several times he was cut down.

ARMED PREPAREDNESS IN CAMP

A result of all this was a state of armed preparedness in each tent. No one felt very safe in going to sleep, but the camp at last was quiet.

On Sunday we returned to Butte. The next morning we said good-bye to our hosts and started for Spokane. It seemed good to be flying again, although the weather was chill and rainy. We flew over Anaconda, Missoula, and the Bitterroot Mountains. A little later we en-

OVERTAKING THE ADVANCE PLANE

It was always easy for the *Spirit of St. Louis* to catch up with the advance plane, as it had a speed of 10 to 15 miles an hour more than the other ship. In this picture a few scattered houses can be seen far below, the main group being almost directly in line with the left wheel of the plane. In the more outlying parts of the country an hour or more would frequently pass without any signs of habitation.

countered some fog, but got through without much trouble.

### FLYING TO SEATTLE UNDER DIFFICULTIES

The Spokane program went off smoothly. We regretted that we could not stay for the National Air Races, but our schedule was fixed.

The flight to Seattle was more difficult. Clouds hung very low over the mountains, filling most of the passes. Colonel Lindbergh had to climb up over them to pass the range. On the other side he found a hole through which he managed to pick up the ground again.

We were forced to detour far to the south, for we carried much less gas than the *Spirit of St. Louis*. If we had crossed the range and had been unable to find a hole in the clouds, there would not have been enough gas left to carry us back. For this reason we had to look for an open pass. Cispus Pass was the first one we could find. This took us close by Mount Adams and almost within view of Portland, our next day's stop. From this point we turned north, flying up the Columbia River.

With less than half an hour's gas left, we landed at Sand Point, Seattle. We could have landed for fuel at Portland or Tacoma, however, if we had desired.

The next day was quite as interesting, though less troublesome. We followed the Columbia River most of the way. Stern-wheelers passed beneath us, pushing log rafts. At one side of the river a huge raft waited its turn at a lumber mill. Fishermen stared up at us from small boats, as we flew down by them.

Once a cannery whistle sent us a greeting. We could not hear it because of our engine, but the white steam was easily seen. The day was warm and clear. We cruised along slowly, enjoying every moment in the air.

### PORTLAND'S AIRPORT IS AN ISLAND

At Portland we landed at Swan Island airport, in the center of the Willamette

A FOREST-FIRE OBSERVATION STATION BETWEEN BUTTE, MONTANA, AND BOISE, IDAHO

The wide strip across the side of the mountain is part of a trail leading up to this isolated post. Several of these forest-fire stations were found far out in the thickest forests in the Northwest.

River. This island was selected by the city to take care of seaplanes as well as land planes.

From Portland to San Francisco was a longer flight, but the scenery made up for this. We flew over Crater Lake, a small body of water in the crater of an extinct volcano. The surface of the lake is high above the water level of the surrounding country. We climbed up to get a good glimpse of Mount Shasta, a very beautiful scene, as the day was clear and bright. Its snowcap was visible for many miles.

The Golden Gate was covered with a faint haze as we came into San Francisco. Still, we were able to get a good view of the bay and the long piers that reached out into the water. By the clock on the water-front tower we saw that we were on time (see illustration, page 40). We went on to the airport, while Colonel Lindbergh circled about the city.

Next day we took off early, as there were many things we wished to see. Among these were the Seal Rocks, the Cliff House, and a wrecked ship at the entrance to the harbor. Across the Golden Gate we saw the redwood forests and Mount Tamalpais. As we headed back toward Oakland we saw scores of ferryboats shuttling back and forth across the bay.

Once or twice we had to turn sharply to

miss flocks of sea gulls. A forced landing from a shattered propeller could have been caused by striking one of these birds.

### OAKLAND IS EXPERIENCED IN HANDLING AIRPORT CROWDS

At Berkeley we came down for a closer view of the University of California. A few minutes later we landed at Oakland upon the same ground used by the trans-pacific flyers in their take-off for Hawaii.

The Oakland police had become accustomed to handling crowds during these flights. Their control on our arrival was perfect. The touch-stop program went off without any difficulty (see illustrations, pages 38 and 39).

At the end of an hour we took off again for Sacramento. Over Suisun Bay we saw a perfect formation of large birds. They seemed to be pelicans. We came down very close, expecting to see the formation break at our approach. Instead, the birds swung into an arc and began circling to the left. We began banking and followed them. Because of our higher speed, we gained very quickly. One at a time, those nearest us gave up and slipped away to one side. Three or four of the birds, however, held stubbornly to the formation, turning as rapidly as we.

### HEAVY TRAFFIC SHOWS WAY TO SACRAMENTO'S AIRPORT

When we came into Sacramento we found we had neglected to get maps locating the airport. All that is necessary is to know the direction of the airport from the center of the city. With this information, a pilot can fly in that direction until he sees the field. If the direction is not known, he may fly aimlessly for a long time before he locates it.

This time there was not much trouble. Love solved the problem by watching the highways leading out of the city. One of them contained more traffic than the others, so we followed it and in a few minutes came to the airport.

From Sacramento we flew to Reno. On the way we passed over Lake Tahoe, Pyramid Lake, and Smoke Creek Desert.

The flight to Los Angeles took us over Carson City and the Yosemite National Park. We spent a little time flying over the park, with its beautiful falls and peaks, then passed along the Sierra Nevada.

Farther south we came down into Death Valley. Although we were flying at more than 100 miles per hour, the heat was quite oppressive. It must have been very uncomfortable for the few automobile tourists we saw crawling along a few hundred feet below us. Once or twice we dropped down beside them and waved. We could have landed, for the floor of the desert in several places was packed almost as hard as rock. After Death Valley, we passed over Borax Flat.

### "SPIRIT OF ST. LOUIS" REACHES ITS STARTING POINT

At Los Angeles the program was completed as if by clockwork. With memories of a pleasant stay, we started the next morning for San Diego.

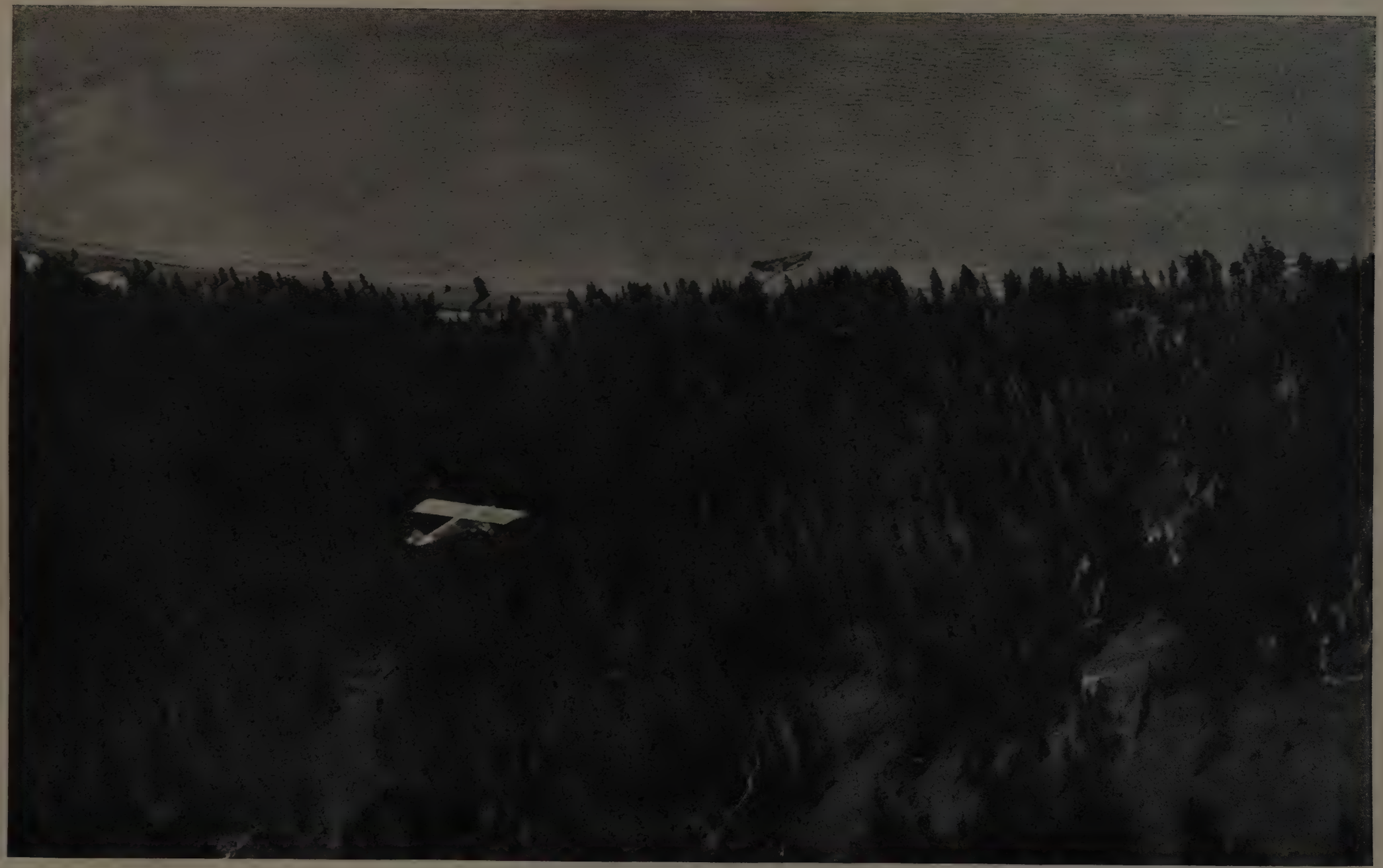
The day was clear, so we flew down the coast at a low altitude. We passed Long Beach, with its forest of oil-well derricks (see illustration, page 41). Then came groups of cottages, and open stretches where great flocks of birds covered the beach. The larger birds paid little attention to us, though a few flapped away lazily. The smaller ones hastily flew for cover.

Our visit to San Diego did not follow the usual routine. Many of the people who greeted us were the ones who waved good-bye to Colonel Lindbergh on the take-off for New York in May. The *Spirit of St. Louis* had now completed a round trip. San Diego also marked a turning point of the tour, for from here we turned back east, so that the rest seemed fairly easy.

During our two-day stop the ships were given a close inspection. Both were found to be in very good condition and ready for the last part of the tour. From San Diego we flew to Tucson, Arizona, where we met Martin Jensen, who had won second place in the Dole flight to Honolulu, then on to El Paso, after a touch stop at Lordsburg, New Mexico.

### A MIDNIGHT START FOR THE HARDEST DAY'S FLYING

Before landing at El Paso we flew along the edge of the border for a glance at



APPROACHING YELLOWSTONE LAKE

Colonel Lindbergh's plane is shown here nearing the wind-rippled Yellowstone Lake, beyond which lie Old Faithful and other geysers. By a glance at the direction of these ripples a pilot can tell instantly the angle from which the wind is blowing. This helps him to check his drift and lateral movement from the course he wishes to fly.

FLYING OVER YELLOWSTONE LAKE

Flying so close to the water would have been hazardous with the unreliable equipment in use several years ago. Pilots using the modern engines, such as that in the *Spirit of St. Louis*, have no fear in flying so low. Crossing such a small body of water could hardly be considered hazardous by the one who flew over the Atlantic Ocean.

THE STATE CAPITOL OF MONTANA, AT HELENA

One of the interesting features of this picture is the crisscrossing of the roads in the foreground, which suggests that here anyone desiring to travel in a certain direction proceeds in that way, making his own road.

Juarez and that part of Mexico which lies below the Rio Grande at this point.

Our next day took us to Santa Fé. This is a very picturesque city and one which appears even more beautiful from the air. The program here was purposely shortened, for the hardest day of the tour lay before us. We turned in at about 6:30, leaving a call for fifteen minutes after midnight. We ate breakfast at 1 o'clock and an hour later were on our way to the airport.

The engines were started with the aid of flashlights. An automobile was stationed at the far end of the field with its lights at right angles to the runway. Other cars were lined up, so that their lights pointed in the direction of taking off. Colonel Lindbergh left the ground first and we came close behind.

We found no trouble in flying after we had cleared the field. The sky was free from clouds and the stars gave some light. At regular intervals Colonel Lindbergh swung his flashlight in a wide circle to show where he was; otherwise, flying along in the dark, we might possibly have run into him. We had not expected to do any night flying and had not equipped the *Spirit of St. Louis* with navigation lights.

We had expected to watch the sunrise, but before dawn several cloud layers came between us and the earth. There was no sight of Colonel Lindbergh at daylight.

We could not get down through the clouds for two hours, as we were unable to find any break in the last layer. It would have been unwise to fly down blindly, for we might have struck a mountain before we could see it. When we did find a hole we learned we were some distance from our course, but by opening up the engine we reached Abilene in a short time.

From Abilene we went on to Fort Worth, then Dallas and Oklahoma City.

From here the tour went rapidly. At Tulsa we met Arthur C. Goebel, winner of the first prize in the Dole San Francisco-to-Honolulu flight. At Little Rock we were very sorry to hear of the death of the Governor of Tennessee. We canceled our visit to Nashville and added an extra day at Memphis.

THE CAPITOL BUILDING OF WASHINGTON STATE

Olympia was one of the 192 cities over which Colonel Lindbergh circled during his nation-wide tour. At the extreme right of the photograph, on the lawn between the two buildings, may be seen a large group of school children, who gathered at this point to watch the *Spirit of St. Louis* fly over. Here, as in each of the other cities, Colonel Lindbergh spent five or ten minutes flying low enough to give everybody a chance to view his famous plane. Even these fleeting visits had a very desirable effect, for in some cases airports were established as a result of the enthusiasm aroused in this way. A substantial increase in air mail for many of these cities was also noticed by the Post Office Department.

On our way to Chattanooga we flew over Muscle Shoals and obtained some pictures of the Government nitrate project (see illustration, page 46).

Another rest day awaited us at Birmingham, and we were feeling much better than at the middle of the tour, when we took off for Jackson, Mississippi, where three Navy planes from Pensacola took part in the day's program.

When we reached Lake Ponchartrain we ran into a heavy storm and had to detour for several miles. A driving rain was falling as we passed over New Orleans, though it had not reached the airport.

It was still raining when we reached the city, so that the reception committee had raised the top of Colonel Lindbergh's car. The parade had hardly begun, however, when we noticed that the people along the streets could not see the guest of honor. With no thought of his own discomfort, he requested that the top be lowered, after which he climbed up on the back seat. Seeing that the public had spent hours waiting for him in the rain, he thought it only fair to show his appreciation for such interest.

Rain pursued us to Jacksonville, Florida, our next stop.

### PILOT VISITS SPOT WHERE HE HAD CRASHED

The rest of the tour was almost a direct flight north. On the way to Atlanta we flew over the spot where Love had crashed in 1925, while flying over cotton fields and dropping an arsenic dust preparation to kill the boll weevil.

During the time he was working in this way he contracted a case of slow arsenic

THE UNIVERSITY OF CALIFORNIA STADIUM AT BERKELEY

This brief side flight was made on the spur of the moment, when the tour party decided to do a little sightseeing.

A GLIMPSE OF THE CROWD AT OAKLAND (SEE, ALSO, PAGE 39)

This modern airport when completed will cover 825 acres and will be one of the largest in the world. At present it has one runway 7,000 feet long and 250 feet wide. There is also a square area, part of which is here shown, now ready for use. This is 1,700 by 2,500 feet. The white circle and the name "Oakland" are made permanent by the use of crushed stone. These markings are a very great help to the airman who is flying cross-country over strange territory. Hangars, night lighting equipment, and other apparatus are being installed.

ANOTHER GLIMPSE OF BERKELEY

Heading toward the hills in the valley of which lies the city of Berkeley, the tour party flew low over these University of California buildings.

AUTOMOBILES PARKED AT THE OAKLAND AIRPORT

These are only a portion of the vast number of automobiles parked at one side of the airport at Oakland, where a temporary stop was made. This was the airport used by the trans-pacific flyers in taking off for Honolulu, and is a recent development. It did not exist at the time of the Byrd Plane Tour of the preceding year, when Floyd Bennett flew across the United States. This is an indication of the rapidity with which cities are acquiring modern airports and preparing for this new system of transportation.

Photograph from Californians, Inc.

THE SAN FRANCISCO WATER FRONT FROM THE AIR

The clock in the tower along the row of piers is the one by which Colonel Lindbergh found that he was on time in arriving at the Golden Gate. Even at this hour, long before he was due to parade up Market Street, this famous thoroughfare was black with seething masses of humanity, while

A FOREST OF OIL-WELL TOWERS AT LONG BEACH, CALIFORNIA

Thick as trees in a forest are these derricks along the California coast at Long Beach. This point was passed by the aviators on the way from Los Angeles to San Diego. The day was fine, so that there was no danger in flying low out over the beach and watching the ever-changing scenes along the shores of the Golden State.

INDIANS INSPECTING THE "SPIRIT OF ST. LOUIS" AT TULSA

Inclosures were erected at almost every stopping place where there were no hangars or where, as in this case, the city wished to leave the ship on display. A strong barrier was necessary to keep the plane from being demolished by pressure of the eager crowds. Another reason for these inclosures was to keep away the vast number of people who forgot that Colonel Lindbergh could not possibly shake hands with each one or give an autograph to all of those who requested these souvenirs of his visit.

poisoning. One day, while flying at the low altitude which this work requires, he became unconscious and crashed. The spot where the plane struck the ground was still visible when we flew over and Love circled around it for 10 minutes, explaining just how it had happened. Precautions are now taken against poisoning in work of this kind.

### ROUGHEST AIR OF TOUR ENCOUNTERED BESIDE STONE MOUNTAIN

Atlanta was the next stop. As we left on the following day for Spartanburg we flew by Stone Mountain, on the side of which the Confederate Memorial is being carved. We had a very close view of the men working on the side of the mountain, and of the outlines of the memorial. At this place we experienced the roughest air encountered during the tour, caused by the air currents descending the side of the cliff.

Just before we left the mountain, we flew over the top of it and were surprised to note the same sensation usually experienced in looking over the edge of a high building. None of us had ever felt this before while flying, although many people believe the feeling to be a part of flying. We decided it was caused by our looking down over the edge and seeing the cliff pass suddenly beneath us only a few feet away.

In order to accommodate the large number of people who wished to attend the banquet, the committee at Spartanburg secured the dining room of Converse College. The girl students had been glad to offer their dining room for Colonel Lindbergh, even though it meant that they had to content themselves with a "bag supper" in their rooms. The only condition which they made was that Colonel Lindbergh on his way to the dining room should walk down a lane formed by all the fair students.

I neglected to explain this proviso to him until he was entering the hall of the building, and for a moment I thought he was going to make a hasty retreat. However, followed closely by the rest of the party, he hurriedly walked the gauntlet of a thousand admiring feminine eyes.

Atlanta and Spartanburg, like the next five cities visited, are to be stopping points on the air-mail route from New York to Atlanta. After March 1 fast mail planes will be flying back and forth at night over the completely lighted airway connecting these cities. Good airports have already been established at most of these places.

A touch stop was made at Greensboro before reaching Winston-Salem. The city of High Point joined with the others of the Tri-Cities in a general program at Winston-Salem. Here we added Kusterer to our party in the advance plane. He had finished all his work and had come back to see how we followed his plans.

At Richmond we were met by Mr. Guggenheim, who had come down from New York to witness a day's program. During the week-end at this city Colonel Lindbergh took Governor Byrd and Mr. Guggenheim for a flight in the *Spirit of St. Louis.*

An unannounced visit was made at Washington on Monday, and on Tuesday we left for Baltimore. There was a very low "ceiling" and it was raining heavily in spots, but we made the short flight with only a few detours.

### THE LAST "OFFICIAL" DAY

From Baltimore to Atlantic City was another flight under gray skies. On this trip the advance plane carried Clarence M. Young, Director of the Aëronautics Branch, Department of Commerce, as a passenger.

Flying back across the Delaware, we landed at Wilmington with but one more stop before the end. The last city was Philadelphia, where every detail was well carried out. The last "official" day ended satisfactorily for all of us.

We had expected that the tour would be somewhat of a strain, especially near the end, for we were averaging more time than air-mail pilots during the same period. However, the nicety with which the many details of the program were carried out by the cities pleasantly surprised us, and we ended the journey feeling better than at the halfway point.

Along the entire route the greatest credit should be given those in charge of policing at airports, handling of parades, arranging banquets, and making explanations to the countless hundreds who insisted on personal interviews with Colonel Lindbergh.

So efficient was the policing at some places that some members of the party

"PULLING THROUGH" THE PROPELLER

C. C. Maidment, mechanic on the tour, is shown about to "pull through" the propeller on the *Spirit of St. Louis*. This ship does not have a starter, as this would have meant much more weight during the transatlantic flight. Many modern planes are equipped with starters. At many of the touch stops the assembled crowds surpassed the population of the town, as throngs of people came from remote sections, many of them starting the day before, to catch a glimpse of Colonel Lindbergh, even though he was to remain but a few minutes at the airport.

had difficulty in identifying themselves. At Philadelphia this was well illustrated. Phil Love accidentally became separated from the rest of the party near the speaker's stand at the Sesquicentennial Stadium. Kusterer and I, on the stand, caught sight of his arguing with a giant of a policeman who even refused to look at his card.

We held a little conference and decided to see if Love's powers of persuasion would prove effective. When we last saw him he was still engaged in a heated argument and did not seem to have much success.

Half an hour after we reached the hotel one of the plain-clothes men at the door to our suite came in rather disturbed. "There is a red-headed fellow out here that acts pretty mad," he told us. "We started to put him out, but we wanted to be sure we were right. Would you mind taking a look at him?"

Kusterer and I went out and found our pilot in a very aggrieved state. We were strongly tempted to tell the policeman that we had never seen him before, but realizing that we had one more flight to make with him, we decided it was safer to let him in.

### RELIABILITY AND PUNCTUALITY OF AIRPLANES PROVED

Now that the end of the tour was at hand, we did not know whether to be glad or sorry.

Soon we were in the air for the last flight, and in a little while were over Mitchel Field, slipping down for a landing. We taxied into a space at one side. A few minutes later the wheels of the *Spirit of St. Louis* rested on the hangar floor they had left more than three months previously.

The United States Tour was over. We had proved what we set out to do—that modern airplanes with present-day engines can keep to regular schedules as successfully as railroad trains. Some of the facts of the tour bear out this statement. We had no mechanical trouble of any kind. With one exception, we kept to the

THE OLD WAY TO TRAVEL AND THE NEW

In the lower right corner of the photograph is the shadow of the advance plane, from which this picture was taken. The steamer *Sprague* was headed up the Mississippi, toward Memphis. After circling the steamer for several minutes, the advance plane straightened out toward Memphis, where it arrived within 20 minutes. It took the steamer four hours to cover the distance.

PART OF THE FLOODED AREA BELOW MEMPHIS

Dropping down the Mississippi, both planes flew along the banks to look over the recently devastated areas. This was one of the places where the flood waters had not receded. The steamer *W. M. Rees* is pushing heavily loaded barges upstream.

AN UNUSUAL GLIMPSE OF THE NITRATE PLANT AT MUSCLE SHOALS

The airplane offers many advantages to the engineer, or to anyone wishing to get a complete picture of such a large project as this. Aërial mapping, surveying, and photography are already extensively used in many parts of the country. The planning of parks, laying out of new streets, and improvement of civic architecture are facilitated by means of the airplane.

schedule made out before the tour began. The exception was at Portland, Maine (see text, page 7), which has been explained. Weather conditions were normal during the tour. We flew through fog, rain, snow and darkness as well as in clear weather.

The total mileage covered by the *Spirit of St. Louis* was 22,350 miles. The advance plane flew 20,350 miles. This difference was caused by Colonel Lindbergh flying half an hour more each day to allow the advance plane to arrive ahead.

The entire trip was made in 260 flying hours, or the equivalent of eleven days. The accompanying map (page 5) does not show where all of this mileage was obtained, for we seldom flew a straight course. On 192 occasions we zigzagged between stops to circle cities and drop messages. Other detours were for sightseeing.

One fact impressed on us during the three months was the great advantage of the airplane over other forms of transportation, especially in mountain country. Here the automobile and the railroad train must wind back and forth in order to negotiate the grades, or deviate to find passes. The airplane simply climbs up and flies across in a straight line. It needs no bridge to cross a river; it needs no road to get by a thick forest.

All these things make the airplane a most natural means of transportation in mountainous and isolated parts of the country. It is, of course, a great time-saver everywhere, but it should be of special value in our larger, more sparsely settled States.

Some day air tourists will follow many of the invisible air trails along which Colonel Lindbergh passed in his nation-wide tour. They will look down upon the garden spots of America from comfortable air transports in which they will travel with the same feeling of safety as in railroad trains.

To such travelers alone will come the fullest appreciation of this beautiful country of ours. Only from the air can one attain to a complete realization of the vastness of the continent, of its ever-changing panorama, and of its thousands of beautiful scenes.

# DALMATIAN DAYS

## Coasting Along Debatable Shores Where Latin and Slav Meet

By Melville Chater

Author of "Across the Midi in a Canoe," "History's Greatest Trek," "The Shores of Sunrise," etc., etc., in the National Geographic Magazine

"MY PLAN," he explained, opening a map on the drop-table in our railway compartment, "is to do Yugoslavia's western frontier from the Alps to Albania. I'll take off among snow peaks, descend to the Adriatic, coast along Dalmatia, and end atop Montenegro's mountains."

We had become acquaintances on the eastbound Orient Express. He proved to be a retired United States consul, now traveling for pleasure, or, as he jokingly put it, on acquired momentum. He spoke innumerable tongues, including a dash of Romany, and his mind was a storehouse of knowledge, picked up in the big capitals and queer corners of the world.

How many traveling Americans really know the United States consul and his works? In real life, as distinct from "Madame Butterfly," he doesn't waste much time in adjusting naval officers' love affairs, and your little matter of a passport visa or of lost baggage is but a detail of his office day.

He is ever at his task of preparing economic reports which, percolating through business or journalistic channels, assist in interpreting some foreign country to the American people. To this end he has, at times, contributed veritable books, entailing years of patient research in preparation, to the archives of the American Consular Service.

### WHERE AUSTRIA, ITALY, AND YUGOSLAVIA MEET

Such are some of his multifarious works, performed under the insignia of the Eagle and the Arrows, that emblem which greets many an American in many an outlandish spot, with its warming touch of home.

Having somewhat similar plans in mind, the ex-consul and I ended by adopting each other, on the basis of his itinerary, as fellow travelers.

We made the necessary rail connection in that magnificent Alpine territory where the borders of three states meet. Slowly our train wound through a wild gorge whose green, ribbonlike rivulets thrashed their way in and out of tempting trout pools en route to the Sava. Such is the Slovenian pass which thrusts itself wedgelike between Italy and Austria or, conversely, opens funnellike into Yugoslavia (see map, page 50).

Local humorists affirm that Italian and Austrian loggers, perched on the gorge's opposite crests, have been known to yell across Yugoslavia, "How's the grub in your camp?" But Paul Bunyan, mythical colossus among North American lumberjacks and past master in the gentle art of exaggeration, would probably have drawled his yarn thus: "I washed my shirt and hung it out across Yugoslavia to dry, so's the sleeves flopped down into Austria and the tail hung over into Italy."

The Slovenian valley, where nestles Yugoslavia's frontier village of Kranjska Gora, measures at that point, from one mountain boundary to the other, scarcely five miles. Yet what a five-mile stretch of Alpine sward, lying like some great turquoise cup whose sheer sides are crowned, as Roman wine cups were crowned, with snow!

Here tiny Kranjska Gora huddles under the drifted Razor whose great, sky-cutting blade rivals the Moslem's fabled scimitar bridge to Paradise.

One doesn't bother about names at Kranjska Gora. Either you sleep at "the inn" or else at "the other inn." And there are no street names, because nobody would know what to do with them. A house number is all the address that any one of the 750 villagers needs, and that of

Photograph by Melville Chater

BENEATH THE APPLE BLOSSOMS OF KRANJSKA GORA

This tiny frontier village of Yugoslavia nestles in the valley of the Sava, at this point a five-mile stretch of Alpine sward between the Karawanken and Julian Alps. It is a center for mountain climbing and skiing.

"Kranjska Gora 150" will remain the numerical limit until the next bridegroom builds "Kranjska Gora 151" for his bride.

It was Maytime — Alpine Maytime. The apple trees bent under their blossom-drifts and the dandelion was already a puffball. The dried-up river bed revealed prone tree skeletons, the work of last autumn's torrents. The skiing ground was a lush pasture, and the skiers had trekked to surrounding mountain tops, where light snows were still falling.

### CROSSING CROATIA'S MOUNTAINS

Following the gray-green Sava, arush over pebbly bottoms, and with the Karawanken's grotesque profiles sinking away where farmland revealed red-petticoated women in the furrows, we continued eastward to Zagreb; then turned westward toward Fiume. This sharp detour crossed the panorama of Croatia's magnificently forested mountain country as our train climbed to the regional watershed before descending to the Adriatic.

### A REGION OF JACK-IN-THE-BOX RIVERS

The route held its surprises. Imagine a mountain town halved by a rushing river which plunges forty yards into a crevasse under the sidewalk, and then, three miles farther on, pops up unexpectedly, to resume its surface course. Yet such fluvial feats characterize not only Croatia, but the entirety of those barren highlands which extend southward behind the Yugoslav coast.

They form the so-called Karst region, which geologists have compared to a vast petrified sponge. Such are the tricks that time and rushing streams have played with the Karst's easily decomposed limestone. "Now you see us and now you don't!" gurgle in chorus a whole system of such jack-in-the-box rivers, as they plunge into the mountains' eastern flank,

LAKE BLED PROVIDES THE SETTING FOR A MINIATURE OF DREAMLIKE BEAUTY

The pilgrimage church and crag-topping castle reflect their profiles in still, blue waters which lie between the snow peaks of the Karawanken and the Julian Alps.

Photographs by Melville Chater

THE OLD AND NEW DISPENSATIONS AT KRANJSKA GORA

The girl on the right has long hair, native head kerchief, and the useful broom. The "flapper" on the left has bobbed hair, skirt at half-mast, swagger cane, and vanity box.

Drawn by A. H. Bumstead

A MAP OF THE DALMATIAN COAST

So indented is the eastern shoreline of the Adriatic that its sinuosities measure three times the airline distance from Trieste to Kotor. On this coast Eastern and Western culture meet. The author's "Dalmatian Days" were spent in a leisurely journey, traveling by rail and water from the northwestern tip of the Serb, Croat, Slovene State (Yugoslavia) at Kranjska Gora to Cetinje, capital of the former kingdom of Montenegro.

triumphantly reissuing, scores of miles westward, as feeders of estuaries or, in one case, as a fresh-water spring emerging from sea bottom.

Had some Marco Polo left us an account of the marvelous Land of Spongy Mountains, whose rivers cut through the bases of ranges 1,000 feet high, we might have dismissed him as a fabulist; yet in sober fact a Montenegrin river has performed that identical feat.

### WHERE FARMS ARE HOLES IN THE ROCK

While descending through the indescribably sterile-looking Karst, I turned to my companion: "Why, in this desert, build those innumerable, circular stone walls to inclose at most a bit of grass? It seems hardly worth while."

"Don't worry!" he laughed. "Man never labors unnecessarily. What you see are karst-holes—extremely rich oases. I once wrote a report on karst-hole farming." And he explained how, in that land of jack-in-the-box rivers, natural precipitation, instead of draining into streams, sinks through the porous stone, carrying vegetable matter along with it, and enriches a regional series of funnellike ditches. Thus, "farming in holes"—the karst-holes, which sometimes number several hundred within a small area—provides grain for the inhabitants of this mountain-side desert.

Photograph by Hans Hildenbrand

BEANS FOR HER BASKET

Zagreb's market, lasting from early morning until about noon, is held in the heart of the Croatian capital, in Jelačić Square, named for the hero of the Croat revolution against Hungary in 1848 (see, also, Color Plate IX). At evening, after all the country folk have departed, the citizens invade the square and seat themselves at small tables outside the coffee shops.

The blinding, sizzling Karst came to a spectacular end when we espied, from nearly half a mile above, what appeared as a gigantic relief map, the Istrian mountains curving around the Gulf of Quarnero, and to southward the Velebit Mountains' outflung ridge spanning the rim of illimitable Adriatic blue.

### A RIVER REPRESENTS THE HYPHEN IN FIUME-SUŠAK

"My recollection of Fiume," observed the ex-consul, as we drove to our hotel, "is that its front doors are on the sea and its back doors are among the mountains."

Any prospective visitor to Fiume who may question that picturesque statement is hereby invited to climb up 425 certain steep steps, taking them in cool weather and "on low." He will find himself among the city's back doors, overlooking the Velebit ridge. A turn about will give him an airman's view of the terraced hillside by which Fiume-Sušak descends to its far-stretched curve of wharfage; and from one's feet there plunges headlong the mere ribbon of water that divides what is practically one city into two ports, Fiume and Sušak—the former in Italy, the latter in Yugoslavia.

Probably no narrower stream than the Rečina ever demarked so important a frontier. Its little, internationalized bridge, which is aptly symbolized by the hyphen in "Fiume-Sušak," can be crossed in one minute. You may dine in Italy and take strolls in Yugoslavia between the courses. A baseball battery warming up across the Rečina, with the pitcher in Yugoslavia and the catcher in Italy, would be spaced approximately at the regulation distance.

### DALMATIA'S INDENTED SHORE LINE TRIPLES ITS LENGTH

We bought and tussled with a map of the Yugoslav coast. It gave us that hopeless feeling which possibly overcame the first explorer who attempted to chart Maine's coast line. Also, we sympathized with that other explorer, who, weary of counting islands in the St. Lawrence, probably said, "Oh, let's name 'em the

Photograph by Hans Hildenbrand

A RELIGIOUS PROCESSION NEAR ZAGREB

The simple piety of Yugoslav peasants is revealed wherever a rustic shrine awaits the burdened wayfarer. From above pine-dark precipice or foaming torrent, from beside tilled field and peaceful pasture, it looms up—the lonely figure of the Crucified, with thorn-crowned head and flower-bestrewn feet, with gaunt body flecked with white among the snowlike flurries of apple blossoms

Thousand Islands and call it a day's work!"

Even Maine's shores are rivaled in their zigzag conformation by those of Dalmatia. While a direct course along the Yugoslav littoral measures 300 sea miles, the indented length of that coast is almost three times as long. As for the man-sized job of counting Dalmatia's islands, that has been simplified by ignoring insignificant islets and putting the archipelago's units at 600 and its area at 2,009 square miles.

### A CLEAN SWEEP OF AUSTRO-HUNGARIAN PLACE NAMES

Our map presented other difficulties. The Kingdom of the Serbs, Croats and Slovenes (Yugoslavia) has made a clean sweep of former Austro-Hungarian place names in favor of their Slav equivalents.* Like the out-of-luck American tourist who wouldn't stop off at "Praha" because he wanted to get on to Prague, we often needed a bilingual key to ascertain where we were. So we compiled a list of Yugoslav place names, bracketing their prewar equivalents, as follows: Lake Bled (Veldeser See), Lake Bohinj (Wocheiner See), Zagreb (Agram), Zadar (Zara), Šibenik (Sebenico), Trogir (Trau), Solin (Salona), Split (Spalato), Gruž (Gravosa), Dubrovnik (Ragusa), Kotor (Cattaro).

As neither railroad nor motor trail spans the Yugoslav coast, we took that oldest and most appropriate of routes, the sea lane, to rediscover those shores whose maritime fame antedated England's by centuries. From among luxurious liners, more modest steamers, and fleets of sailing craft, one may choose one's traveling style along what is one of the best-served littorals in south European waters.

As Sušak fell astern, Italy disappeared behind islands, to remain invisible throughout our entire voyage. With an archipelago barring the open sea and with the Velebit's barren heights rising behind the narrow coast, it seemed as if we were navigating a succession of blue, flawlessly calm lagoons.

"Good-bye, Europe!" said the ex-consul, waving a hand toward Italy. He added, "Small wonder that, with mountains barring the east and an archipelago barring the west, Dalmatia has always been a debatable land or halfway house, where racially speaking, Europe and Asia meet."*

Certainly, the more one sees of Dalmatia, the more one feels himself to be, while not exactly out of Europe, yet somehow among the fringes of the Orient.

I recalled that this "debatable land" had once been disputed by Rome's eastern and western empires; that Islam's armies were here confronted by Christianity's outposts; that here had been the meeting ground of Latin and Slav; that to-day Dalmatia is still the borderland of the Catholic and the Greek Orthodox faiths.

Now and then we touched port in some deep-set bay with its hill-perched townlet—often an almost streetless clump of vine-clad houses—which had dug its heels into the Velebit and held on while as yet Venice was unheard of. Yet the specter of the lagoon republic, medieval Dalmatia's protectress, still haunts every nook and corner of the Yugoslav coast.

Once we even found a bit of junked antiquity mortared into a peasant's house wall. It was a big carving of St. Mark's imperious, Bible-brandishing lion which, regrettably, had been almost obliterated by successive coats of green paint. The proprietor claimed that living with that old carved lion had finally got on his nerves. He wasn't certain about green lions, but at least, he said, it was a cheery color.

### A TOWN IN MOURNING FOR FIVE HUNDRED YEARS

At the pleasantly informal seaside resort of Crkvenica we were astonished to find the town in mourning. Every native woman was clothed in black, and grandmothers sat knitting things of the same funereal hue. Had the *bora,* that fearful "wind of the dead," taken toll among the local fishing fleet? We questioned a subdued, rather henpecked-looking native. Sadly he replied:

"It's for the Frankopan family. Much beloved, kicked out of the country, some of them executed. And the women have worn mourning ever since. No, they never let go, our womenfolk don't—I'm a

* See, also, "The Whirlpool of the Balkans," by George Higgins Moses in the NATIONAL GEOGRAPHIC MAGAZINE for February, 1921.

*See, also, "East of the Adriatic," by Kenneth McKenzie in the NATIONAL GEOGRAPHIC MAGAZINE for December, 1912.

Photograph by Erdelyi

PROVIDERS OF THE WHEREWITHAL FOR A PICNIC

Dalmatia's 10,000 fishermen haul up yearly some 4,000 tons of finny wealth, three-fourths of which consists of sardines. The boats with their great colored sails form one of the most noteworthy attractions of the coast. The wind known as the *bora,* "the demon of the Adriatic," occasionally takes heavy toll from the fishing fleet.

Photograph by Melville Chater

STEERAGE PASSENGERS

Sheep are numerous in the Karst region and in isolated districts of Dalmatia. Some are bred chiefly for their milk, used in cheese-making; but most of them provide the meat mainstay of the peasants. The wool of the native animal is too coarse for the better grades of cloth, but efforts are being made to improve it.

married man myself—once they get an idea into their heads" (see page 58).

We were about to inquire whether the mourned ones were Bill, or Pete, or Mamie Frankopan, or who, when he resumed: "You'll find Frankopan castle ruins everywhere along this Croatian coast. It all happened along about the fifteenth century. Yes, they're obstinate when you cross them, our women are. Nursing a sorrow, *I'd* call it."

We were properly sympathetic, and then, trusting not to jar indecently on any Frankopan mourner's grief, we betook ourselves to Crkvenica's gayest bathing beach.

Our connecting steamer wound through the narrow, lagoonlike waters, known along the coast as "canals," which had once been ruled by those petty potentates for whom, Croatian tradition asserts, mourning weeds have become perpetuated as a national costume.

Now the Velebit range, its barren, slate-gray flanks queerly diagramed with walled karst-holes, thrust menacingly forward, barring Croatia from the Adriatic. Occasionally there appeared V-shaped valleys where some tiny, stucco port nestled among a luxuriance of trees, hedged gardens, and terraced vineyards. Such are the Velebit's always amazing oases, created by subterranean streams.

## ILLYRIAN PEASANTS BECAME EMPERORS

A wild strip, this, of the ancient Illyrian coast! Wild, too, were the first Illyrians, a mixture of pre-Homeric Greeks and those wandering Asians, the Liburni, after whom Rome called the country Liburnia. Legend says that from Cadmus and Harmonia, through their son Illyrius, sprang the tribes that perpetuated his name.

Herodotus describes the Illyrians as tattooed savages, addicted to human sacrifice. Next we hear of them as redoubtable pirates, ravaging the Greek and Italian coasts. Later they became prime recruiting material for Rome's legions. And last we actually behold Illyrian peasants, in the persons of Claudius, Aurelian,

Photograph by Merl La Voy

OFF TO THE RIVER WITH THE WEEKLY WASH

It isn't a "blue Monday," however, for the gathering at the open-air washtub is as much a social as a workaday affair, where the local gossip can be passed around. Besides her duties at the tub, the peasant woman, always a hard worker, must tend the cattle, milk the cows, make cheese, perhaps spin and weave, clean, cook, and in season help in the fields. On winter evenings, by candlelight, she makes the fine laces and embroideries for which she is famous (see, also, page 83).

Diocletian, and Maximian, assuming the Eternal City's imperial purple.

In the third century B. C. Illyria advanced from the status of a geographical region to that of a kingdom which comprised the Adriatic's eastern shore as far south as Albania; and in 180 B. C., when the people of Dalmisia (the modern Almissa) revolted from the Illyrian crown, the state of Dalmatia emerged.

Just north of Zara (Zadar) we entered the waters of ancient Dalmatia. Ranging in width from one to 35 miles, this little sliver of a state enjoyed a well-developed coast which played its famous rôle in the sea commerce of the Middle Ages.

Dalmatia of to-day has an area of 4,916 square miles. The industries supporting her 650,000 people are cattle breeding, viticulture, cereal raising, and, of course,

fishing. Her nets are tended by 10,000 fishermen, who haul up annually some 4,000 tons of finny wealth. Though salt shortage and other causes have diminished Dalmatia's cannery trade, she was in post-war days a formidable picnic provider, with a yearly output of 2,500,000 tins of sardines.

### THE HOME OF THE "MARASCHINO"

Zara, once Dalmatia's capital and still her chief center for turning the *marasca* (wild cherry) into "maraschino," is a charming little promontory town whose ancient fortifications have been modified into a marine parade.

A ramble through the Italianate streets and squares puts one quite in key to tell one's waiter, *"Spaghetti ed un po' di Chianti!"* Only the presence of Croatian peasants resplendent in embroidered jackets, red sashes, and red pill-box caps—the men wearing baggy-seated knee pants, the women wearing brilliantly patterned, ruglike aprons, and all wearing toetilted, rawhide sandals—served to remind us that, although on Italian-administered soil, we were in the land of the color-loving Slav (see illustration, page 59).

Photograph by Melville Chater

"JUNKED" ANTIQUITY AT SUŠAK

Now as some crumbled column, now as some bleared coat of arms over a once-ducal archway, or again as a disfigured slab bearing the Bible-brandishing Lion of St. Mark, the specter of the Venetian Republic still haunts Dalmatia. This slab lies before the mortuary chapel of Tersatto, the ruined castle of the Frankopans (see, also, page 53) at Sušak, the Yugoslav sister town to Italian Fiume.

Meanwhile the Velebit's sea-skirting ridge had reached its maximum at 5,768 feet and had fallen away, as the Dinaric Alps thrust forward their continuing barrier. In fact, the entire Yugoslav coast—its sapphire waters, its ports and red-roofed villages, its tropical oases of palmettos and cactus—has an almost unvarying background of mountain walls, yellow and barren as sea sand, which frame the picture with a certain barbaric magnificence.

En route from Zara to Šibenik, when a gale got on its hind legs and kicked the hitherto placid Adriatic into whitecaps, and soup plates volplaned across the dining saloon, we mentioned "bora" to the skipper.

He grinned and said, "It's only a bagful of breeze. And anyway, when the

Photograph by Melville Chater

NURSING A SORROW FOR 500 YEARS

At Crkvenica, a watering resort on the Adriatic, the women have worn black ever since the beloved Frankopan (Frangipani) family of petty potentates was driven from the region in the fifteenth century (see, also, page 53).

real bora strikes this coast, we sailormen have no monopoly on sudden death. It's not so many years ago that the bora came tearing down through a mountain gorge, hurled a passenger train off the rails, and—well, I saw that wreck. Give me a wet death!"

### ŠIBENIK SENDS ALUMINUM ORE TO AMERICA

Hill-crowned Šibenik, from whose busy quays 100,000 metric tons of bauxite are exported annually to the aluminum factories in the United States, possesses the unusual combination of fine medieval monuments with a population to match; for it goes back to the Middle Ages, that extraordinary regalia of red-and-black shakoes, rainbow-hued aprons, filigree-embellished bodices and jackets, which makes gay the town's exclusively native population.

One finds here the appearance of a carnival on every street corner, the makings of a fancy-dress ball at any market booth. Western clothes are recalled with horror. And one marvels that it is these simple peasants who, with their hand looms and embroidery needles, have preserved the antique picturesqueness of human apparel (see Color Plates I and XVI).

A Sunday morning's gathering of worshipers, thus costumed, in the town's Venetianate cathedral piazza, now named Wilson Square, is a spectacle that plunges one into the Middle Ages. It was Messer Georgius Matthei Dalmaticus, master architect, who planned this stone flower of an early Renaissance cathedral.

### A CHAUCERIAN PAGEANT IN STONE

But another genius, albeit nameless, contributed his master touch thereto, a touch so warmly human that the beholder's heart throbs across the centuries in tune with that of the Unknown Carver; for, on the exterior surface of the cathedral's rear wall and almost within arm's reach, he carved a stone frieze of some seventy little heads, portraits of the men and women of his day (see page 61).

They are instantly recognizable—the spade-bearded merchant, the doughty

Photograph by Kilophot

ZARA IS A CITY OF CONTRADICTIONS

The seeming paradox of its Italianate streets peopled with Croatian peasants in resplendent costumes is explained by the Treaty of Rapallo, which defines this one-time capital of Dalmatia as a free city under Italian jurisdiction. The ancient fortifications of the charming little promontory town have been modified into a marine parade.

A FEMININE BIT OF "OLD NASSAU" ON ADRIATIC SHORES

At Vodice, a tiny, vine-growing promontory town near Šibenik, the women wear black skirts with orange stripes around hem and waist; black bodice with orange yokes across shoulder-blades and chest; black shoes, and orange head scarf (see text, page 62).

Photographs by Melville Chater

WOMEN OF VODICE FORM FOR THE RING DANCE

The slow and stately *kolo* (literally, "wheel") is a familiar dance throughout the Balkan Peninsula. On Sunday mornings, after church, the young folks assemble to dance to the music of the native *tamburica,* and the old people listen to a blind fiddler singing heroic songs.

A PAGEANT IN STONE

On the exterior of the rear wall of the Šibenik Cathedral, an Unknown Carver has wrought a human comedy in a frieze of some 70 small heads. They constitute a Canterbury pilgrimage etched in stone (see text, page 58).

Photographs by Melville Chater

THE DAISY BUSINESS FLOURISHES IN TROGIR

The workman is raking daisy heads to and fro on a canvas-covered pavement at the quay. When they are dry he will put them into bags for export as a basis for insect powder (see, also, text, page 64).

Photograph by Melville Chater

BRISK TRADING ENLIVENS THE MARKET PLACE AT SPLIT

The women are selling the wild cherry known as the *marasca,* from which the liqueur maraschino is made. The center of this industry is at Zara (Zadar) (see, also, page 57), but it is carried on at various places in Dalmatia.

Crusader, the pancake-capped squire, the cloddish peasant, the turbaned Turk, the cowled, sanctimonious friar, the whining mendicant. And such ladies! Lean-faced or fat-jowled, coquettishly a-simper or grossly ogling, they range from the Crusader's veiled dame to leering Moll o' the stews. Withal, what robust, Rabelaisian freakishness, what a vivid, Chaucerian pageant of virtue, vice, hypocrisy, folly! Here is the human comedy in little, a Canterbury pilgrimage etched in stone.

One ponders on that Unknown Carver. Was he a realist, born before his time? Was he some pot-boiling genius turned church mason, yet unable to suppress his art urge? Surely, whenever Messer Georgius would cheer on his workmen with "Put God into the fashioning of our church!" the Unknown Carver would urge whimsically, "And prythee, master, just a touch o' poor human nature, too!"

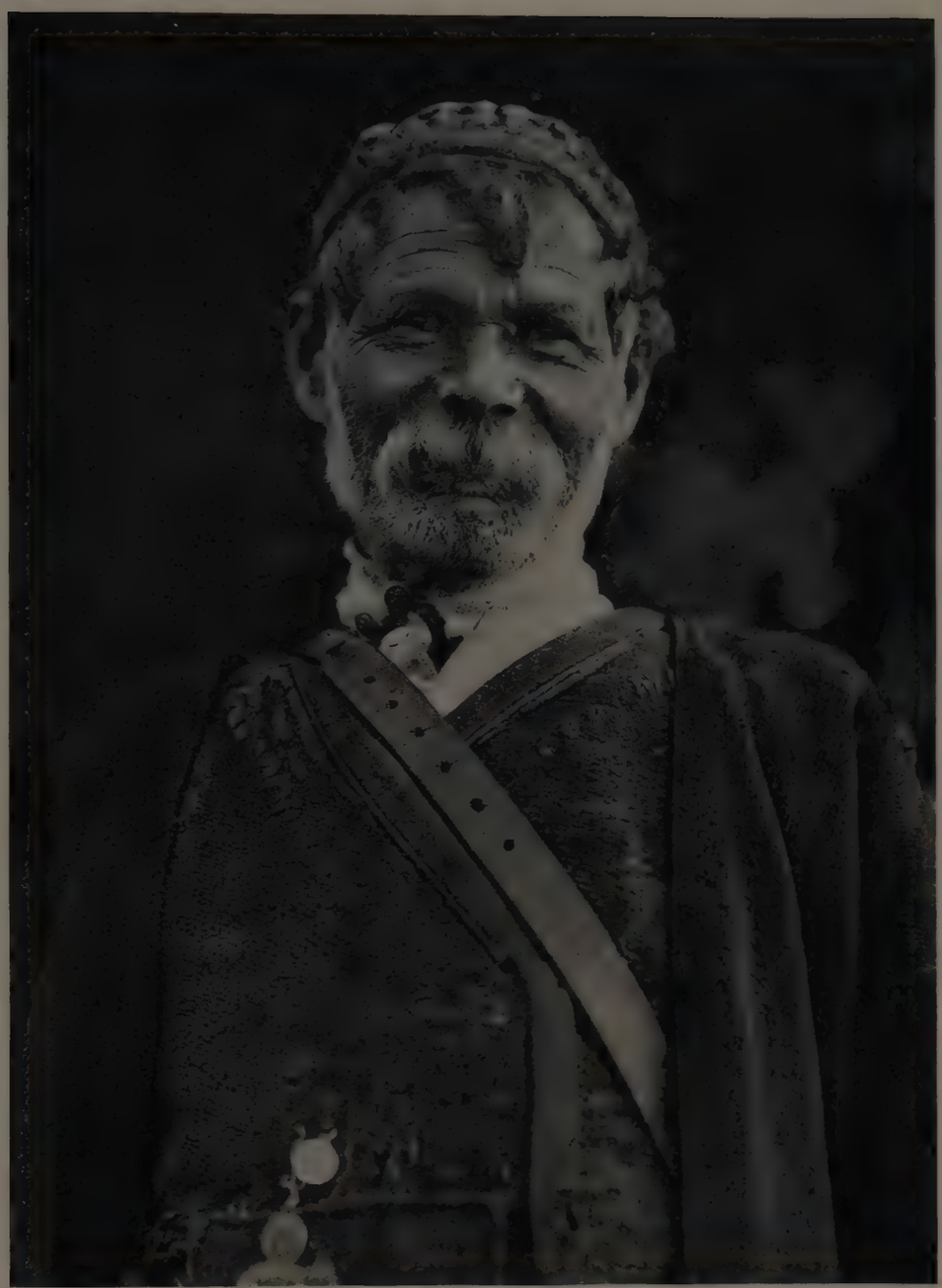
### A BIT OF PRINCETON IN DALMATIA

How we discovered a little bit of Princeton and "Old Nassau" on the Adriatic's shores is worth telling. It was at Vodice, near Šibenik, on the occasion of a church festival. En route to the scene, our excursion boat picked up a stunningly costumed Vodicean girl. She wore a black, flared skirt with orange stripes around the hem and waistline; a black, balloon-sleeved bodice with orange "yokes" across shoulder-blades and chest, black shoes, and

an orange scarf, drawn tight as a skullcap, over her head. As she set down a watermelon between her feet she suggested a sort of female Princetonian quarterback about to snap the ball.

At intermediate stops several more orange-and-black Vodicean girls got aboard. "Is this Princeton Junction or what?" I heard my companion mutter. But we were unprepared for the spectacle which awaited us on Vodice's wharf. Some 1,800 souls inhabit that tiny, vine-growing promontory town, and its 1,000 women dress exclusively in the orange-and-black costume, virtually a uniform, which I have described. Well, there on the quay stood those 1,000 Princetonianesque females, whose welcoming yells needed only a megaphone-brandishing cheer-leader to confirm our fleeting suspicion that some one had just made a touchdown or clouted a homer with the bases full (see page 60).

The ex-consul, who is a strong Yale fan, with two boys at that university, grew quite annoyed at this orgy of Princeton colors. I believe if I hadn't soothed him he would have burst defiantly into song about the prowess of Old Eli's sons.



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HARSH OF ASPECT BUT LIGHT OF HEART

Except in the sheltered valleys of the littoral, Dalmatia's soil is poor, and the hard-working peasant farmers have little more than a tenth of it under the plow. Before the World War individual proprietorship was rare, the land being held by the *zadruga*, or household community, now obsolete. The present government's first step was to abolish feudal privileges—many of Dalmatia's land rights dated back to the period of Roman colonization—and to expropriate the landed estates. The present proposal is that the peasants become the proprietors of the land they cultivate.

FEMININE VANITY ALMOST OVERWHELMS THE AUTHOR

But let no one suppose that the habitual wearing of identical costumes disturbs the Vodicean female's conviction that, be she flapper or grandmother, she is the best-dressed woman in town. "I'll take a photogr—" Hardly had the fatal words passed my lips when from 1,000 throats there arose a chorus of delighted shrieks. —"of just *one* costume," I hastily amended; but it was too late.

The human sea of orange-and-black femininity precipitated itself upon me and my camera, and I narrowly escaped by

fleeing to a housetop. Finally the mayor pacified the baffled mob by announcing that if the ladies would perform the Dalmatian *kolo* (round dance) in the public square, every last one of them would appear in my photograph (see page 60).

Our next stop was Trogir. Though but a few hours from such considerable towns as Šibenik and Split, this walled and seagirt townlet, with its primitive folk, its superb church architecture, and its doorways adorned with crumbled carvings of the Venetian period, seems as remote from to-day as the street life depicted in some medieval painting (see Color Plate V).

Trogir has its lofty campanile—no unworthy second to that at Venice—and a Gothic cathedral whose portal, carved with quaint scenes of the Annunciation and the Nativity, is one of those unexpected gems in which Dalmatia abounds.

### GATHERING DAISIES FOR INSECT POWDER

Near Trogir's towngate, with its inevitable, seaward-facing Lion of St. Mark, I found natives raking millions of dried daisy heads to and fro on a canvas-covered pavement. Puzzled, I made a dumb-show inquiry of the foreman. He looked up and began scratching himself. I repeated my dumb show, and this time he scratched himself all over, while prudently I moved to windward of him.

"It seems too bad they don't import insect powder," I remarked to the ex-consul, who had just strolled up. "And is this outfit the Dried Daisy Products Corporation? If so, what does it produce?"

He questioned the foreman; then laughed: "He says he tried to put the idea over to you by scratching himself. It seems that Trogir exports dried daisies for the manufacture of insect powder."

By post automobile, along the beautifully cultivated Riviera of the Seven Castles, we came to Solin and Split. The former, now a busy harbor, figuring importantly in Yugoslavia's annual cement exportations of 350,000 tons, assumed archeological importance in 1833, when excavations revealed the remains of Salona, once the capital of Roman Dalmatia.

Solin is the preface to Split. Surely no city ever had a more picturesque advent than when barbarian torches fired Salona in 620 A. D., and its refugees trekked to the deserted palace of a long-dead Roman emperor and, rabbitlike, burrowed in. And their descendants haven't moved out yet. You may still trace Split's strange beginnings by wandering about the mammoth structure, powerfully walled and gated, whereto the invalid Diocletian retired upon his abdication (see Color Plate XI).

### AN ANCIENT EMPEROR'S PALACE HOUSES 3,000 PEOPLE

Incidentally, the size of a Roman ex-emperor's retinue may be gauged by the fact that this once-splendid palace, within whose walls a web of streets and a parasitic growth of dwellings have developed, houses 3,000 people.

Its sea-facing frontage, commanding the palmetto-fringed esplanade and the busy quays which render Split the chief Yugoslav port, offers surely the strangest spectacle that ever revivified a Roman palace; for here, set high in a wall in which 38 Corinthian capitals are imbedded, are rows of humble, green-shuttered windows where shirtsleeved fathers smoke their pipes, and grandmothers water potted plants, and mothers patch garments for their swarming broods.

Turning a palace into a tenement-house formed the kernel of a city which to-day numbers 32,000 people. And though its Venetianate streets of balcony and archway will continue to expand, due to Split's commercial importance, they will never outlast their Roman-built, slum-inhabited nucleus, where, among pagan temples abutting on drinking dives, the very stones seem to cry out, mocking an ephemeral modernity, *"Ave Roma immortalis!"*

Split's museum authorities have combed the region to collect precious examples of that embroidered, wide-sleeved, one-piece gown, now fast disappearing from among the peasants, which was derived from what Dalmatia gave to the world as a liturgical garment, the dalmatic, 1,700 years ago.

As for the still discoverable Bosnian bodice, literally sheathed in gold and silver coins, it represents more female cunning than is immediately apparent. Said

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PEASANTS OF THE LAND WHERE EAST MEETS WEST

During the last two centuries the Dalmatian coast has been successively the possession of Venice, France, and Austria. To-day, as an integral part of the new Slav state, the Kingdom of the Serbs, Croats, and Slovenes, it links the Eastern and Western zones of civilization.

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THE QUEEN CITY OF THE SOUTH ADRIATIC

Backed by hills whose only snows are midwinter almond blossoms, and with sky-blue seas and sea-blue skies, Dubrovnik (Ragusa) invokes all the magic of medieval Adriatic days. Soft climate, tropical flowers, mellow architecture, and Old World atmosphere attract throngs of visitors from southeastern Europe to this historic seaport (see also Color Plate XIII).

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Autochrome by Hans Hildenbrand

BARBARIAN TORCHES CREATED SPLIT

When the Avars fired near-by Solin (Salona) in the seventh century, its inhabitants trekked to the deserted palace of Diocletian at Split (Spalato), and founded a new city within its walls (see also Color Plates XI and XV). This view from Mount Marjan shows the palmetto-fringed esplanade and the busy quays of Yugoslavia's chief port.

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Autochrome by Hans Hildenbrand

ROCK-CROWNING KLIS DEFIED BESIEGERS OF OLD

The strong position of this fortress near Split, known as Clissa in prewar days, caused it to play a prominent rôle in the Turkish wars. From the village at its base hillsides green with olive trees slope gently to a valley.

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Autochrome by Hans Hildenbrand

TROGIR RETAINS ITS MEDIEVAL WITCHERY

Both architecture and situation combine to make beautiful this tiny town, formerly known as Trau. Its towers, walls, and public buildings bear the stamp of Venice. It is built upon an islet lying between a larger island and the mainland.

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Autochrome by Hans Hildenbrand

DALMATIAN NOBLEMAN AND PEASANT AGAINST A BACKGROUND OF RURAL SERENITY

Storied remains of historic events, brilliantly clad people, and beauty of landscape, mellowed and rugged, combine to furnish a wealth of atmosphere to Dalmatia.

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Autochrome by Hans Hildenbrand

PROGRESS HAS NOT ROBBED THE DALMATIAN OF HIS PICTURESQUE ATTIRE

These prosperous peasants live in the region between Split and Dubrovnik, where the soil is fertile and the crops large. Dalmatian Slavs are commonly known as Morlachs, a name which the whirligig of language has corrupted from Mavro-Vlachs—Black Vlachs.

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REPRESENTATIVES OF A STALWART, HANDSOME RACE

Although some Dalmatians are blond, more often they have olive skins, dark hair and dark eyes, set off to advantage by their brightly colored costumes.

PEASANT CRONIES OF ZAGREB

Their vests, bright with buttons and gay with stitching, are usually worn unfastened.

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Autochromes by Hans Hildenbrand

MARKET DAY AT ZAGREB (AGRAM)

Long tables, with aisles between, constitute the stalls, and the marketers display their fruits and vegetables in clean willow baskets or in neat piles.

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MONTENEGRO'S NATIONAL DRESS REVEALS THE INHERENT PRIDE AND DIGNITY OF ITS WEARERS

Men of the Black Mountain region wear a long, wide-skirted coat, heavily embroidered, which opens in front over a gold-decorated waistcoat. The dark blue trousers bag to the knee. White homespun incases the legs, or, if the man be a bit of a dandy, as in the case of this trio, a pair of high black riding boots. The broad belt of plaid silk which confines the coat to the waist holds a full assortment of knives and pistols, without which the man's

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A PORTION OF A ROMAN EMPEROR'S PALACE FORMS SPLIT'S TOWN SQUARE

This was the center and most beautiful part of Diocletian's palace (see also Color Plate III). Motley little shops and houses cling like parasites to the blackened columns of cipollino and rose-colored granite on the right. The columns on the left front the emperor's mausoleum, now the Cathedral. The four rear columns belong to what was formerly the Vestibule, at the entrance to the imperial apartments.

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SHE PUTS HER SHOPPING BAG TO MANY USES

It serves as cradle for the baby, a wardrobe for clothes, a larder for provisions, and as transportation for little pigs market-bound. Many peasants like these of the Breno Valley, near Dubrovnik, came to America as immigrants before the World War.

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RAGUSA MILITANT CONJURES UP A DRAMATIC PAST

Rock-set, rampart-encircled, sea-washed old Ragusa, now known as Dubrovnik, is so richly medieval that the beholder cannot separate it from the name under which it achieved its glories as a powerful city republic, worthy companion of Venice and Genoa in the fourteenth century.

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Autochrome by Hans Hildenbrand

THE BRIDGE OF TIME ARCHES THE NERETVA (NARENTA) AT MOSTAR

Whether Roman or Turkish in origin—the point is disputed—this graceful stone span, with flanking gate towers, forms the chief glory of a picture city to which it gave its name. Difficulties in building the foundations disappeared, so the legend goes, when someone had the questionable inspiration of burying two lovers beneath the piers.

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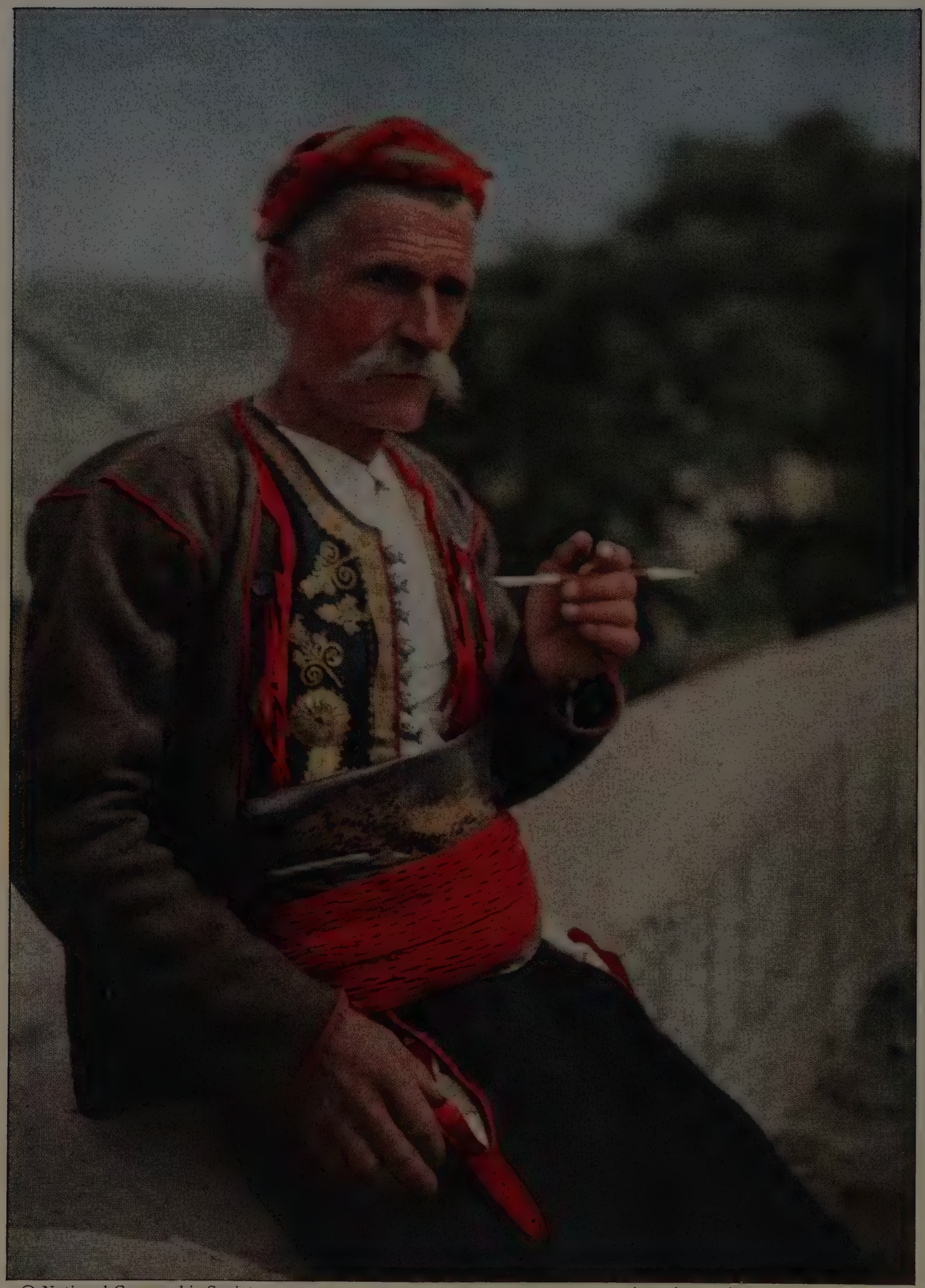
SPLIT'S FISHING BOATS FURL SAFFRON-COLORED SAILS

Behind the jumble of masts and rigging are the remnants of Diocletian's open gallery, with shabby houses wedged in between majestic half-columns and arches.



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HE RELIES UPON HOUSEHOLD INDUSTRY FOR HIS GAY APPAREL

In the land of the color-loving South Slav, it is the simple peasants who, with hand loom and embroidery needle, preserve the picturesqueness of both masculine and feminine costumes.

my native informant, "Bosnian girl who hasn't got a boy yet, she just puts on that money-shirt and sits in bazaar; and pretty soon, you bet, she gets nice boy!"

### HISTORIC CITY MASQUERADES UNDER ANOTHER NAME

Coasting seven hours farther southward, through an astonishing group of islets which lay clustered like lily-pads on a lake, we came, via the pretty harbor of Gruž, to its historically famous neighbor, now known as Dubrovnik.

"No!" objected the ex-consul, when we had explored every fascinating nook and corner of that rampart-encircled, sea-washed citadel of a medieval town, "Dubrovnik as a replacement name, however ancient, won't do. Ragusa forever! I'll yield to the Adriatic being the 'Jadransko,' and to 'Krk' and 'Krf' standing for Veglia and Corfu and not for broadcasting stations; but I simply can't think of the classic Republic of Ragusa as being 'Dubrovnik.'"

And, indeed, so richly medieval is this rockset town that the beholder cannot separate it from the name under which it achieved its medieval glories. If the north Adriatic has her resplendent tiara in Venice, the south Adriatic has her gem-starred coronet in Ragusa (see Color Plates II and XIII).

Backed by hills whose only snows are midwinter almond blossoms and whose terraced trees—olive and aloe, fig and orange, date palm and myrtle—cut the briny air with their blend of southern smells, there arise those medieval ramparts which encircle the domes, the markets, the Venetian-Gothic piles, the shops, and the red-tiled homes of 15,000 people. One would have to visit the much smaller Languedocian fortress town of Aigues-Mortes to behold anything comparable to the picture of Ragusa, modern yet ancient, performing its workaday tasks within 15th-century walls.

Mellow architecture, stately cloisters, ivied city gates, colorful costumes, pigeon-haunted squares, a feast of flowers, a caressing climate of sky-blue seas and sea-blue skies—all the magic of Adriatic days is here to conjure up an aromatic past and to create an abiding memory.

From history's first mention of Ragusa's shipping, down to her acceptance of Venetian supremacy, in 1205, there elapsed three and a half centuries during which the little rock-bound stronghold of refugees burgeoned forth as a miniature maritime republic whose argosies were found in the eastern Mediterranean's every port.

Ragusa's merchant fleet, at the height of her sea fame, numbered 300 vessels, which bore a "great and incredible" trade, as medieval chroniclers state, and plied anywhere from the Thames to the Holy Land. In salt-water slang, "vessel of Ragusa" became "argosy," which will remain a synonym for homeward-wafting wealth as long as poems are penned.

The little republic compiled a complex code of maritime law, built ships for looming Spain, and even sent forth her mariners with the conquistadores' expeditions to the New World.

Though luxury-loving, Ragusa nevertheless made slave trading a capital offense, thus anticipating England's prohibition of "black ivory" by 350 years.

### MAGISTRATES SERVED ONLY ONE MONTH

But growing wealth brought internal jealousies, and so, to ameliorate aristocratic clashes, Ragusa limited the term of office of her chief magistrate to one month; so that he became the ventriloquial mannequin of whichever happened to be the uppermost clique, and his inferiority complex was nursed along by such regulations as that which prohibited him from wearing his foreign decorations except as a corpse at burial.

But presently the great shadow of Venice loomed eastward, and Ragusa thought it politic to flirt with the Bride of the Adriatic for a protectorate, "seeing that it appears to us of great advantage that our country should be subject to Venetian domination." And the just-quoted treaty was supplemented by a statute of inauguration which called for flag-waving, cannon-firing, sermon-preaching, and the universal shout (willy-nilly) of "Long live the magnificent Doge of Venice!"

A constitution, based on that of Venice, was adopted, and a succession of Venetian counts became Ragusa's chief magistrates.

The benefits were mutual. To Venice the little republic's Slav appellation of Dubrovnik (*dubrava* — wood) literally

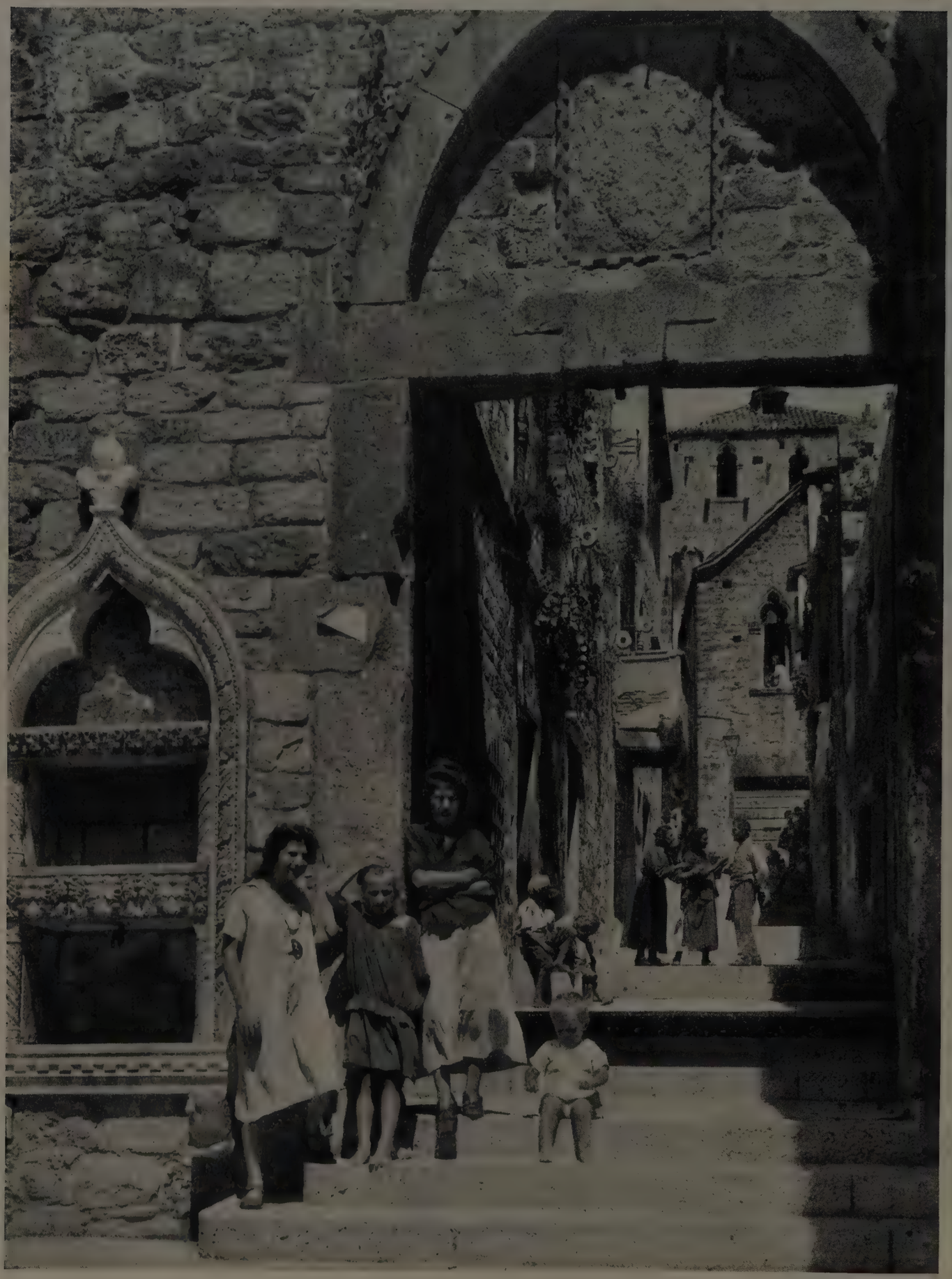
Photograph by Ewing Galloway

Photograph by Edgar S. Aldrich

DUBROVNIK IS THEIR SHOPPING DESTINATION

Photograph by Kilophot

PLYING A SKILLFUL NEEDLE



Photograph by Ewing Galloway

THE PORTA MAGGIORE IS A GATEWAY TO THE PAST AT HVAR

Formerly known as Lesina, the island of Hvar was long the chief naval station of Venice in Dalmatian waters. Its history reaches far back into the misty centuries, for stone cists and bronze implements of the primitive Illyrian race (see text, page 55) have been uncovered in barrows near the town of the same name.

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THE MINCETA TOWER CROWNS DUBROVNIK (RAGUSA)

Despite the martial appearance of its ramparts, which encircle the markets, the Venetian-Gothic piles, the shops, and the red-tiled homes of 15,000 people, old Ragusa was a peace-loving town, which, by diplomatic flirtations, now with one power, now with another, maintained its independence for 1,200 years (see text, page 89).

spelled timber for galleys. And what toll Venice took of her dependency's resinous trees is indicated to-day by the Yugoslav littoral's vast stretches of deforested country. Symbolic indeed was the Ragusan sailormen's Christmas custom of bearing a huge yule log to the resident count's hearth, while singing carols!

### A COAST THAT WAS "PIE FOR PIRATES"

On the other hand, Ragusa piled up the ducats by building Venetian galleys.

Moreover, she was free to frame her own civic laws and her surprisingly comprehensive maritime code. This bore, for example, on the exact personnel of vessels, on seamen's pay rates and rations, and on the shipowner's duty to carry anti-piratical armament.

For, across the tale of Ragusa's sea fame, there runs a broad black stripe betokening the Jolly Roger. The indented, well-sheltered coast that yielded Dalmatia good portage was just the sort of hide-and-seek sea front that constituted pie for pirates. In all the annals of the plank-walking, glass-chewing, loot-and-scuttle-'em type of adventure, Dalmatia's coasts have never been surpassed.

To the list of the Adriatic's city states

Photograph by Melville Chater

THE PIGEONS OF DUBROVNIK'S MARKET SQUARE ARE A REMINDER OF VENICE

add the pirate republic of Pagania. This name celebrated the fact that its "hard-boiled" denizens had been the last Slavs, by a margin of 250 years, to withstand Christianity.

Though ultimately converted, the Paganians never let religious scruples interfere with business. For 150 years they terrorized the Adriatic, raided Venetian lagoons, and even laid that proud city under annual tribute. And though a concerted attack of Venetian galleys finally drove the corsairs from their base on the River Narenta (now the Neretva) to the island of Lagosta, they there reopened their old, established business under the skull-and-bones trade-mark and operated the surrounding waters until 1409.

They were succeeded by the Uskoks (*i. e.*, refugees), who, driven seaward by the Turkish invasion, turned pirate along Dalmatia's coasts. Due to their crafty policy of dividing their loot with the Austrian court and by giving naval service against the Turks, they were permitted to plunder Christian merchantmen for upward of a century.

"Send these sea devils far away from salt water!" insisted some one when, at last, an Austrian-Italian fleet had humbled the Jolly Roger in 1617; and accordingly the corsairs were disoriented by being deported into the mountains, the Uskoken Gebirge, whose name still celebrates the Uskok refugee pirates.

Meanwhile Ragusa continued to flourish for 150 years under Venetian tutelage. Then, in 1348, as if foreshadowing the demise of the great lagoon republic, there befell the plague, sweeping both shores of the Adriatic. "Our Lord God," says the old chronicler, "sent a terrible judgment through an awful and incurable disease, which caused the spitting of blood and swellings on the body." It ravaged Ragusa and carried off three-fifths of the population of Venice.

### RAGUSA MAKES A TRIPLE PLAY—FROM VENICE TO HUNGARY TO TURKEY

The republic of the doges languished awhile, then passed out of the picture as a sea power, relinquishing the Adriatic's eastern shore in 1358. And now canny little Ragusa deemed it politic to cast a coquettish eye on the waxing power of Hungary. Once more, as under Venice, a treaty confirming independence for the

Photograph by Melville Chater

RAGUSAN LIFE EBBS AND FLOWS THROUGH THE CITY GATES

This modern seaport performs workaday tasks within romantic medieval walls. The three girls in the foreground are in Dalmatian costume.

doll's-house republic; once more a period of wealth accumulation by land and sea; for by the 14th century Ragusa had her overland trade route, which extended across the Balkans to Constantinople.

Supplying salt from her marine pans to a saltless interior was among the republic's chief sources of income. The overland trade was carried on by long strings of pack animals, which would issue from Ragusa's *sponza* (caravan headquarters) for their journey across the wild Balkans. Ahead marched an unfortunate scapegoat, whose duty it was to reassure the caravan by beating a drum throughout the day's march. In other words, if ambushed brigands killed him, the drum-beating ceased and the caravan was thus forewarned.

The Turkish invasion overran the Balkans, menacing Hungary, and thrifty little Ragusa reoriented herself. "Business as usual!" she murmured sweetly, and, cutting adrift from Hungary, cast disarming

Photograph by Publishers Photo Service

FEW WATERSCAPES IN EUROPE RIVAL IN SOMBER MAGNIFICENCE THE "MOUTHS OF CATTARO"

glances toward Constantinople in case the Porte turned out to be the next power on the Adriatic.

### NAPOLEON GIVES RAGUSA THE COUP DE GRÂCE

And her international tactics succeeded down to the opening of the 19th century, when, unfortunately for Ragusa, Napoleon determined on setting up the "New Illyrian Provinces" as a base for future conquest. In 1808 his military representative in Dalmatia convened the Ragusan Senate. "The Republic of Ragusa has ceased to exist." So ran the decree, pronounced to a heartbroken senate, which snuffed out the famous little city state after her 1,200 years of independence. And to-day her epitaph may be read at Paris, where *"Raguse"* appears on the roll of Napoleonic victories that adorns the Arc de Triomphe.

We covered the Ragusa-to-Montenegro stage of our journey by motor car. The Dinaric Alps' foothills resolved themselves into a series of fjord-forming promontories, as we turned inland for a five-hour drive past olive plantations, with distant glimpses of the gradually uplifting crags which encircle the Boka Kotorska.

Few waterscapes, in whatever land, can rival these famous "Mouths of Cattaro" in their somber magnificence. Ringed about by rocky walls rising sheer from the water's edge into dizzy heights that completely cut off the outer world, the "mouths" consist of three ramified, strait-connected basins over which vessels lay a zigzag course to and from the Adriatic.

The still, lakelike waters of intense blue scarcely soften one's dread of those encircling crags—mammoth, gnarled sterile—which stir one with a sense of earth's primitive convulsions. You feel as if lost in some vast lake-swallowing crater. You think of Thor and Prometheus, of Wagnerian epic and northern saga—such is the grim, dædal nudity of this vast amphitheater, fit setting for the dramas of mythical demigods.

### CLIMBING TO THE TOP OF MONTENEGRO

I had just learned that one of the surrounding peaks rose to almost 6,000 feet when I overheard some one on the back seat of our car asking rather peevishly, "But when do the mountains begin?"

Up and over 125 hairpin turns which score the mountain side, our car climbed toward loftily remote Montenegro. From the summit of the pass, at an altitude of almost one and one-eighth miles over the sheer drop, at the bottom of which lay a diminutive streak marking the town of Kotor, we beheld, as a birdman from his plane, the big, blue, tri-tongued stretch of the Boka Kotorska. It was so far beneath us as to appear inert, lifeless, and the Adriatic seemed merely a hazy blueness without contour, almost suggesting vacuity.

We were on the top of Montenegro. Its only visible cultivation consisted of small cups of farmland—"cups," I say, because they were each ranged about by sheer crags. Its habitations were stone hovels. Apparently its only denizens were ragged women, hoeing potatoes, and flocks of skinny goats.

To eastward and to southward there lay revealed, with scarcely a shrub or thorn bush to break its terrible monotony, a gray, billowing mass of stone—I had almost said a petrified sea—which stretched away toward snow-clad chains along the Albanian border.

As our car skirted this grim scene, I overheard the man on the back seat reiterate, more peevishly than before, "When do the *real* mountains begin?"

At lunch time, in Cetinje, the mystery of his disappointment was explained. It turned out that he lived on the top of Switzerland and had toyed with Mount Blanc and the Matterhorn ever since he was a child. Truly, be it ever so glacial, there's no place like home!

### A PISTOL PICNIC IN MONTENEGRO

At Cetinje, too, the mystery of an apparently manless Montenegro was solved for us. Indeed, though we had seen no men in the fields, Montenegro turned out to be very much of a two-gun, he-man's country. I was introduced to this fact by a gorgeous individual who wore a crimson, gold-embroidered waistcoat, scarlet shako, bolero jacket, glossy kneeboots, and a purple sash which enfolded an armament of pistols and knives. He sat among a circle of wine-sipping Montene-

Photograph by Melville Chater

A DECK PASSENGER COMES ABOARD

Since neither railroad nor motor trail runs the length of the Yugoslav coast, the sea lane is not only the oldest, but the most appropriate route by which to traverse those shores whose maritime fame antedated England's by centuries.

grin youths, similarly costumed and armed, and he greeted me with, "How do, John! I spik American some very!"

It turned out that he had been in the Yukon, and the next fact he revealed was, "Montenegro is a verree hongree countree."

"What do you work at?" I asked.

"Me—*work?*" Haughtily he shook his head.

"Then, your friends"—I indicated the gorgeously appareled wine-sippers—"don't they work?"

Again he shook his head. "Yes," he sighed, "it's a verree hongree countree. So we cheer up by taking little wines at cafés. Then some *guzla*-player come along and sing to us about Montenegrins' big fight with Turks at Kossovo, hundreds years ago; and that gets us so cheered up that we all jump around and have pistol picnic—everybody shooting in the air."

"Then who *does* work?" I insisted.

"The women milk goats and dig potatoes, if that's what you mean." And he reiterated, rather pointedly this time, "Yes, it's a *verree* hongree countree!" So I slipped him certain coins, and he insisted on firing off his pistols as a sign of gratitude and joy.

Then our motor car drove up, and we descended the great mountain side and climbed aboard the waiting steamer. Kotor dropped astern, the land died away in opalescent mists, and our Slovenian-Dalmatian wanderings resolved themselves into a memory

"Of green days in forest
And of blue days at sea."

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**INDEX FOR JULY-DECEMBER, 1927, VOLUME READY**

**Index for Volume LII (July-December, 1927) of the National Geographic Magazine will be mailed to members upon request.**

# BIRD BANDING, THE TELLTALE OF MIGRATORY FLIGHT

## A Modern Method of Learning the Flight-Ways and Habits of Birds

By E. W. Nelson

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MAN'S interest in birds began in those far-distant primitive days when an intimate knowledge of all the wild life about him was often his only safeguard against starvation.

Long before the dawn of history the mystery in the great northerly and southerly movements each spring and autumn of vast numbers of birds of many kinds keenly interested him and stimulated his imagination. Fantastic theories were built up to account for them and entered into myths and folklore, where some still survive, even in civilized countries.

For a long period the flights of birds were considered serious portents in the affairs of men and even of nations, and priests and soothsayers used them to awe the multitude and to read the future. Literature abounds in references to bird migrations, and the poets of the sagas as well as those of more recent times have felt the mystery of these movements and have repeatedly woven them into their writings.

It has long been known that some of the smaller birds that breed in the north appear in middle latitudes on their return in July. The number of these little voyagers increases in August and the movement is in full tide in September. The hosts of wild fowl linger mainly until October and November, when the frosts of approaching winter in the north send them southward.

The multitude of Warblers that went northward in spring so gaily bedecked in all the bravery of their nuptial colors come trooping back with their young, all clad in sober hues more fitting their present prosaic task of making a living off the country, and laying in a goodly supply of fat to help meet any privations winter may hold in store in the warm southern lands they seek.

### ESKIMOS WELCOME THE COMING OF THE BIRDS

In far northern lands, where untold millions of Ducks and Geese and other wild fowl go to rear their young, the advent, during the last of April or early in May, of the first of these birds is the cause of exultant joy to the people. Contentment fills their hearts, for the coming of the birds marks the end of the long, cold period of scarcity and the beginning of that part of the year in which food is again plentiful.

In the old days fur traders in Canada and Alaska rewarded with tobacco the Indian or Eskimo who saw the first Goose winging its way overhead in spring. White men joined with the natives in the jubilant welcome to the newcomer. In four consecutive seasons the writer witnessed such arrivals among the Eskimos on the icebound shore of Bering Sea.

The first comer was always a single Goose. He circled high overhead, surveying the snow-mantled region where he and his kind would later rear their young. Each time this "scout" appeared to be as excited at seeing his breeding ground as the people were to see him, and the bird would fill the air with a continuous series of loud, clanging notes, sometimes heard long before he could be seen.

After viewing the snowy landscape the scout always turned back and disappeared toward the Yukon without alighting and

Photograph by Thomas Bleyler

SOME OF MAN'S MOST USEFUL FEATHERED FRIENDS

Gulls perform very real services as scavengers, keeping many a beach clear of dead fish and other refuse. They wander far up our rivers and even breed in large numbers on the lakes of the interior.

his kind appeared no more until spots of bare ground became visible.

### MILLIONS MIGRATE AS SEASONS CHANGE

The bird life of the United States is believed to total more than four billion individuals. This means that many hundred millions of migrants move north and south with the changing seasons. Though many go by day and may be seen by all who take the trouble to observe, vast numbers also pass by night.

During the height of the spring migration, those whose ears are attuned to Nature's voices may hear mysterious notes overhead, many of which may be recognized. They mark the course of winged travelers exulting in springtime vigor and approaching nuptials in the haunts which they seek toward the top of the world. Telescopes held on the moon at that time often reveal their silhouettes as they cross its face.

In autumn the throng moves southward over a longer period, and the travelers wear the soberer garb of everyday life.

Though it has been plain that migrating species, in general, move north and south—the movements of some covering nearly or quite the entire length of the continent—yet only vague information on the subject has been available, since it was impossible to determine the movements of individuals. Through bird banding a method is now developed that will not only tell us where individual birds wander, but will enable us to trace their routes and determine the exact areas where they go in the north to rear their young or in the south to winter.

We may also learn something concerning the strange, sporadic occurrence of birds in parts of the world far distant from their homes.

Such wandering individuals are probably much more numerous than we suspect. This is indicated by the repeated occurrences of Robins, Bobolinks, and other American birds in England, and even on Helgoland, that insignificant islet in the North Sea where so many visitors from distant regions have been found. St. Paul Island, the largest of the small Pribilof Islands, in Bering Sea, appears to be another landing place for lost birds, judging from the number of stragglers from

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LIKE ALL GOOD SAILORS, THIS GULL HAS A CHOICE VOCABULARY

When there is no garbage about to be picked up, the Herring Gulls feed largely on small shellfish, sometimes breaking open the shells by carrying them well up into the air and then dropping them on the rocks. This operation has frequently to be repeated several times before the desired result is obtained.

eastern Asia and the Alaskan mainland that have been found there.

### SYSTEMATIC BIRD BANDING IS A MODERN DEVELOPMENT

Systematic marking of birds, each properly recorded for the purpose of studying movements and habits, has developed in Europe and the United States within the past 30 years. The greatest advance has been since 1920 and it is now becoming a well-recognized line of research.

Investigators familiar with the bird life of their districts capture the birds, alive and unharmed, with many ingenious traps, and place a numbered aluminum band or ring on the leg of each. Each band bears a central address, so that whenever the bird is retaken, alive or dead, the finder may forward either the band or the number on it.

The use of birds as messengers by man began in the dim past. Perhaps the earliest record is that of Noah, who is said to

Photograph by R. D. Sloane

A PAIR OF "HONKERS" TAKE THE AIR

After being banded, these two Geese took up their interrupted migration none the worse for the markers they wore away with them.

have sent out the Raven and the Dove to prospect for land.

The first record of birds being marked to distinguish them after flight appears to be in the tenth book of Pliny's Natural History, which states that a Roman sportsman took Swallows from Volaterræ (Volterra), in Tuscany, to Rome. During the chariot races the birds were marked with colors of the winners and then liberated to carry the news back home.

For a time prior to the development of systematic banding, students desirous of lifting the veil of mystery surrounding bird movements cut the feathers so they could readily be identified. Sometimes they marked the birds with bright colors, or attached a small piece of parchment with a legend to a feather or to a leg. These crude and scattered efforts gave little information.

The first record of a bird banded appears to have been made in 1710. A Great Gray Heron, bearing several rings on one leg, was taken in Germany. One of the rings apparently had been placed on it in Turkey.

In 1899 Professor C. C. Mortensen, a school-teacher of Viborg, Denmark, began systematically to band and record Storks, Starlings, and other birds along the general lines which are still in use. Thus he became the pioneer in practical, scientific methods of bird banding, and his success led to the work being taken up in various places, especially in Great Britain, Sweden, elsewhere in Europe, and also in the United States.

The two records of birds banded in Europe being taken on this side of the Atlantic appear to be both of Kittiwake Gulls. The first was a young bird banded June 28, 1923, on the Farne Islands, off the coast of Northumberland. On August 12, 1924, it was killed in the District of St. Barbe, Newfoundland. The second was also banded on the Farne Islands, June 30, 1924, and was taken at Gross Water Bay, Labrador, in October, 1925.

### AUDUBON WAS THE FIRST AMERICAN BIRD BANDER

No bird banded on this side has yet been taken in Europe, although many stray American birds have been recorded

there. One banded American bird, however, has been recovered in Africa (see text, page 119).

In the United States Audubon made the first record of bird marking, about 1803, while he was living on Perkiomen Creek, near Philadelphia. He placed silver cords about the legs of a brood of Phœbes, two of which returned to the same neighborhood the following year.

The pioneers in systematic bird banding in this country were, first, Dr. Leon J. Cole, and later Mr. Howard H. Cleaves. Their enthusiasm enabled them to keep bird banding in continuous operation from the beginning of the century to the time when the work was taken over by the Biological Survey in 1920.

Photograph from U. S. Biological Survey

HE HAS BANDED MORE THAN 4,000 MALLARDS

Mr. F. C. Lincoln is in charge of the bird-banding work of the United States Biological Survey.

No account of bird banding in the United States is complete without mention of Mr. S. Prentiss Baldwin. His able pioneer work from 1914 to 1919 in developing traps and methods for their use in the capture of small birds to be banded, and his continued investigations, merit full appreciation. His work has been done on Inwood Estate, near Thomasville, Georgia, and at Hillcrest, his summer home, near Cleveland, Ohio.

To his successful methods of operation and delightful presentation of the results to the public, combined with the entry of the Biological Survey into the work, with Mr. F. C. Lincoln in charge of this activity, may be credited much of the rapid development of this form of scientific research in America.

Extraordinary work has also been done by Mr. Jack Miner at Kingsville, Ontario, where for years he has carried on the banding of Ducks and Geese attracted to his refuge. He states that 40 per cent of the birds he tags in the autumn return the following spring. Geese bearing his bands have been taken in 23 States. His sanctuary is an unparalleled object lesson of the confidence which may be established between man and wild things when the approach is undertaken in the right spirit (see pages 96-97).

One demonstration of the keen interest in bird banding has been the formation of four regional bird-banding associations, among which has been divided all of the

Photograph by R. D. Sloane

CANADA GEESE TAKE ADVANTAGE OF A FRIEND'S HOSPITALITY

By using corn instead of shot, Mr. Jack Miner has attracted many wild birds to his sanctuary. Once a professional hunter, he is now a conservationist. Each of his bands contains a verse of Scripture and he calls the birds on which he places them his missionaries.

Photograph from W. Oliver Wise

BANDING FEATHERED ROYALTY

It is not until their third year that the Bald Eagles acquire the characteristic white head feathers that give them their name. They are nearly black the first year and quite gray the second. Even a young one is strong enough to require the services of three men to band it.

Photograph by R. D. Sloane

FEATHERED CITIZENS OF THE AIR FIND SANCTUARY HERE

This bird refuge of Kingsville, Ontario, has become a favorite resort for Wild Geese and other migrating flocks (see text, page 95). They know where they are safe and fly up well out of reach of gunshot before venturing off the protected property of the sanctuary.

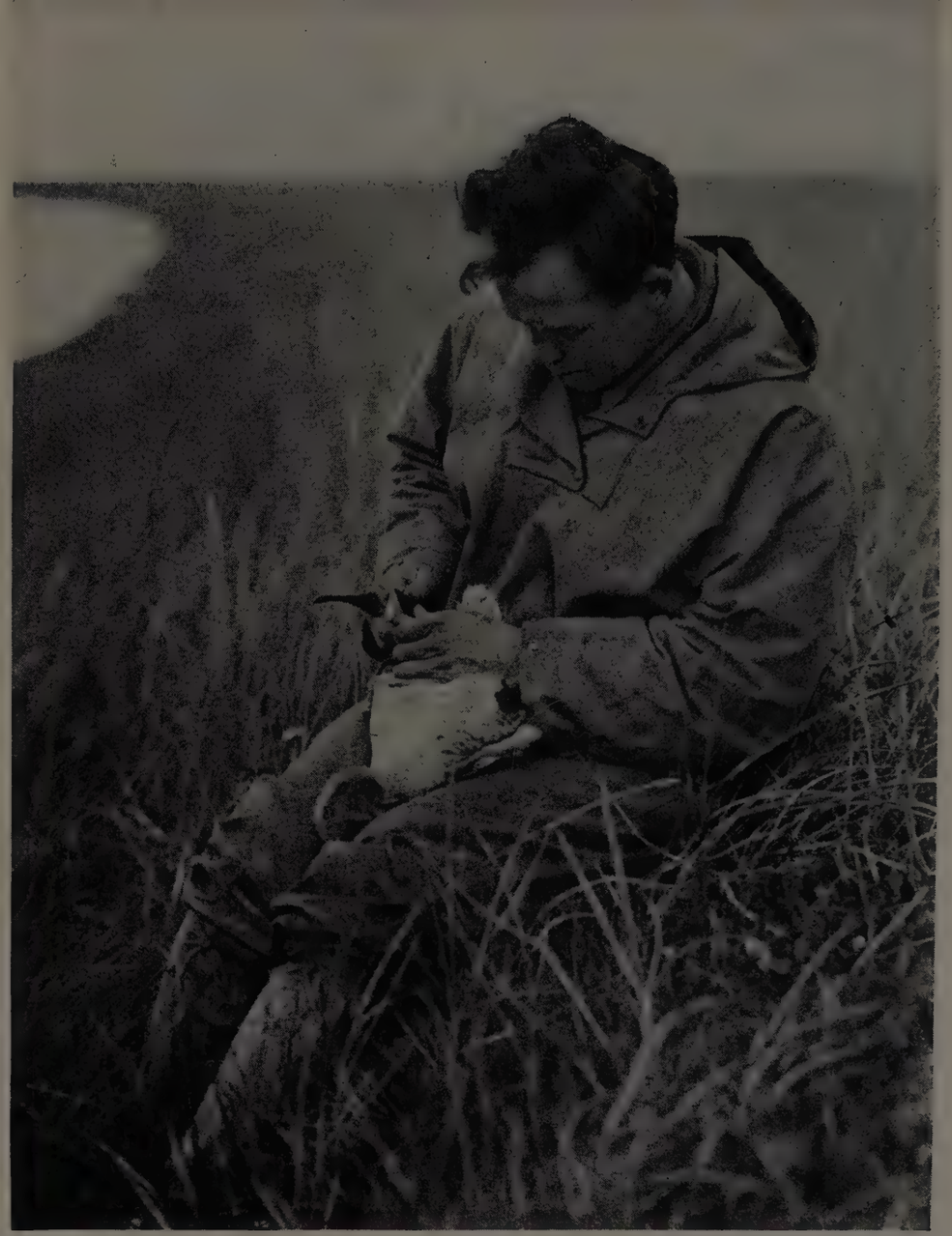
PLACING A BAND ON A STARLING

Hardy and pugnacious, the Starling is well fitted to care for itself in the struggle for existence. Although its ancestors came from Europe less than half a century ago, it has spread rapidly through the north and middle Atlantic sections and threatens to become a real pest.

Photograph by H. L. Stoddard

NOT MEMBERS OF A BUTTERFLY BALLET; JUST QUAIL HUNTERS

One of the unique instruments used to capture birds for banding is the clap net. Bamboo rods rise from sockets in the operator's belt and spread the net.



Photographs from U. S. Biological Survey

A NIMROD OF THE NORTH

With amazing skill, Eskimo boys of Alaska spear the Emperor Geese, from whose skins are made "parkas" (outer garments). Their crude thrower makes it possible to propel a spear much farther than could be done by the hand alone.

PUTTING HIS "TRADE-MARK" ON AN EMPEROR GOOSE

The most beautiful and least known of the Geese summering in the Far North, the Emperor is only a very occasional visitor to the United States in northern California. A peculiarity of the species is the low altitude at which they often fly.

Photograph by R. D. Sloane

THE FRIENDSHIP OF WILD GEESE BEING SUCCESSFULLY CULTIVATED

territory in North America north of Mexico. They have secretaries to keep in touch with the members and to promote their activities.

In addition, these organizations hold annual meetings and publish bulletins and other matter concerning the work. A mass of new information about our bird life is being built up, and the solution of many long-standing mysteries in their movements and habits appears to be near.

### BIRD BANDING WILL APPEAL TO ALL BIRD LOVERS

As bird lovers, a host of members of the National Geographic Society will be interested in this new form of bird study. It has already yielded rich results and promises much for years to come. More people in the United States than in any other part of the world have a real interest in bird life, the numbers running into millions.

In the eastern United States numberless people are familiar with the swarms of graceful and beautifully colored Warblers and other small birds that move northward through our forests in the spring. Earlier in the season, over the entire breadth of the continent, lovers of wild things have their pulses quickened by the thrilling sight of flocks of Cranes, Geese, and Ducks sweeping high across the sky, toward the waters in many a remote northern solitude.

By the human eye alone, it has been impossible to determine that the birds occurring in a locality at different periods are the same individuals that have resided there through the season. Neither has it been possible to distinguish the males from the females in Song Sparrows, House Wrens, and various other species in which the sexes are alike in color. Through banding, these questions can be answered, and also the relations of the individuals of the species to their environment.

Do the representatives of a species that breed in a certain locality remain throughout the year, or is there a shifting of the bird population? At one place in Pennsylvania, Song Sparrows resident there during the winter left in March or April and were replaced by the summer residents, which in turn disappeared on the approach of autumn. No banded Song Sparrow captured there in midsummer

Photograph from U. S. Biological Survey

THESE CAPTURED MALLARDS WILL RECEIVE BIOLOGICAL SURVEY BANDS

was taken in midwinter, and no midwinter bird has ever been taken in summer.

There is good reason to believe that this shifting of individuals from one part of their range to take the place of birds that have moved farther south in autumn is a characteristic habit of many species. Within a few years the facts will be known in regard to this, both as to game and nongame birds, and this information will be of practical service in helping to solve problems of conservation.

### TRAPPING IS ESSENTIAL TO BANDING

At the beginning, most of the birds banded in America were nestlings or parents taken at the nests. The first trap used was the Government Sparrow trap, devised by the Biological Survey to capture English Sparrows. With the growth of bird banding a great variety of small traps, mainly of wire mesh, has been developed through the ingenuity and experiments of those interested in the work.

Some of these traps are automatic; others are operated with drawstrings by a watcher concealed a short distance away.

One successful form of wire trap is attached to a tree trunk. The upper and lower ends form hinged doors, which close when a long cord leading to a nearby place of concealment is pulled. These traps, baited with suet, are successful in capturing Nuthatches, Flickers, and numerous kinds of Woodpeckers.

In addition to the various traps needed for capturing birds of different habits, the matter of bait is important. The food requirements of birds vary greatly, and to take them successfully one must cater to the individual preferences of the different species, and sometimes to individuals of a species.

### BIRD BANDING AIDS CONSERVATION

Experience in administering the Federal Migratory Bird Treaty Act for the protection of migratory birds has forcibly impressed the writer with the urgent need of more definite information concerning movements of such wild fowl. Especially important are data about breeding places of Ducks, Geese, and other game birds which visit our water areas each autumn and winter. Adverse conditions affecting them on their breeding grounds might seriously endanger the existence of these

Photograph by Herbert K. Job

PREDECESSOR OF THE HYDROPLANE

The Lesser Scaup, once in the air, is a high, fast flyer, but has some difficulty in rising from the water. It is a denizen of deep, cold, and prefer-

species. This is becoming more and more important in view of man's encroachment on the few remaining wild places of America, extending to include the exploitation of Arctic lands.

In order that direct efforts might be made to supply information about our migratory bird life, the Biological Survey took over the activities of the American Bird Banding Association and became a clearing house for information concerning this work.

As the majority of birds banded are migratory species protected by Federal law, it also is legally necessary that each coöperator obtain from the Department of Agriculture a permit to capture the birds. At present nearly 1,200 banding stations are in operation in all parts of the country.

The Biological Survey supplies the operator with instructions and several sizes of serially numbered aluminum bands. The operator sends the data regarding each individual bird banded to the Bureau, which has established an indexed card file of such records.

Widespread interest is expressed in reports of the capture of banded birds, of which 13,794, representing about 200 species, have been retaken, either alive or dead. When an American banded bird is taken, its band number and the date and locality in which it was found are communicated to the Biological Survey. The Bureau informs the finder of the origin of the bird, and also notifies the bander of the circumstances of its capture. The notice of capture may come from a neighbor or it may come from an American consul in some remote corner of Spanish America.

### TRAPPING AND BANDING FASCINATE INVESTIGATORS

Even on a town lot, trapping and banding such wild, elusive creatures as birds have the elements of romance and adventure. These are increased in relation to the remoteness and wilder aspects of the surroundings where the work is done.

The recapture, after a long absence, of birds where they were banded is a joyful event. Since last seen the little wanderer may have visited the desolate shore of the Arctic Ocean or may have sojourned in the luxuriant tropical forests under the Equator.

Bird banding opens the door to an intimate knowledge of wild birds in a manner and on a scale hitherto impossible. It fascinates all who engage in it. Not only may definite answers be found to problems formerly unanswerable, but the investigator has the added joy of pitting his wits against those of wild things in their capture. This gives an outlet to that spirit of the chase which has come down to most of us from our primitive ancestors, and is one of its delightful but harmless manifestations, to be classed with the sport of wild-life photography.

### BANDING DOES NOT INJURE BIRDS

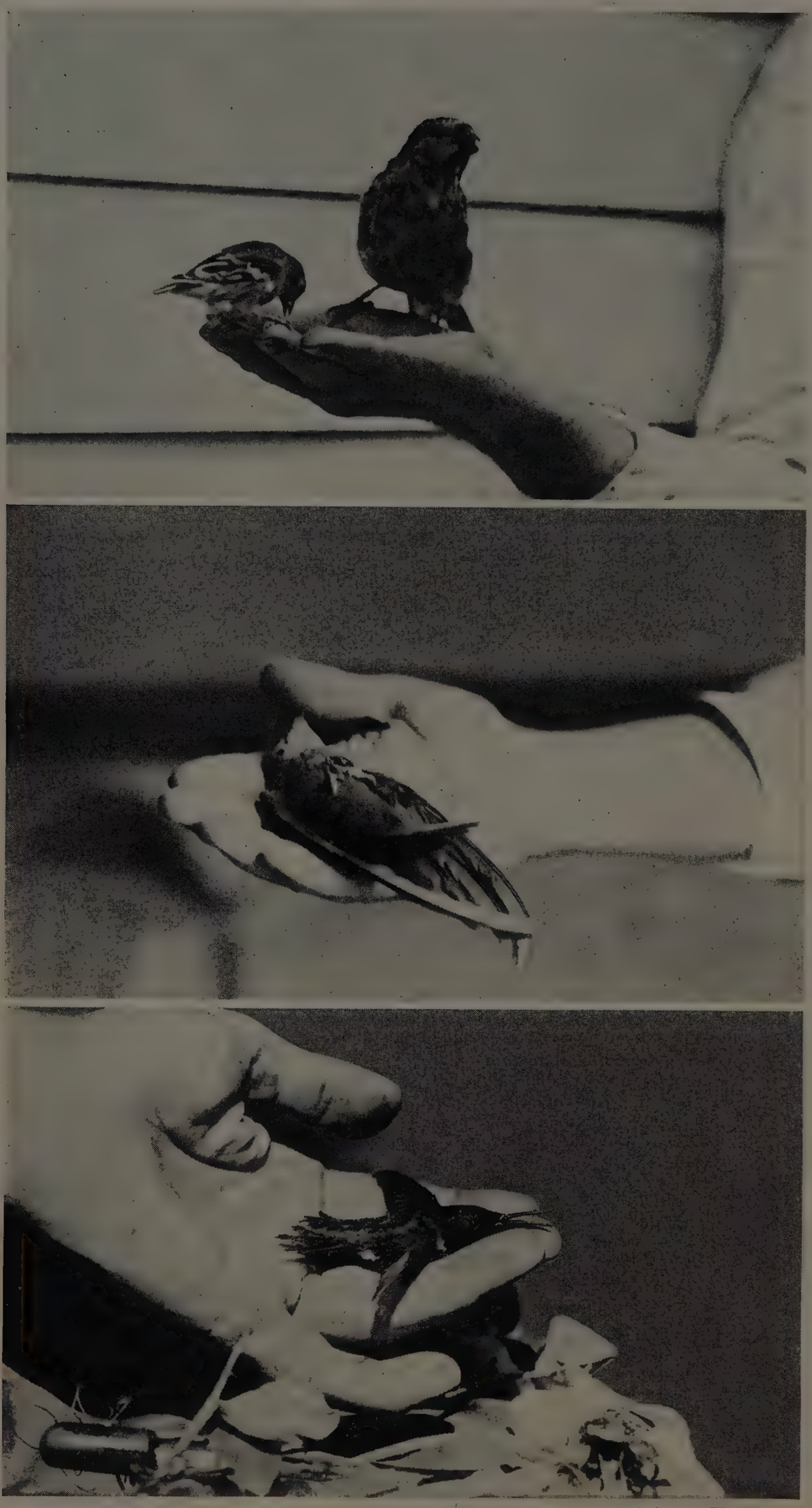
Endless opportunity is open for the improvement of traps and methods of operation, and one of the strongest appeals of all in the work is the opportunity it affords to hold in hand and become intimately acquainted with our charming woodland friends.

Experience has proved that the trapping, handling, and banding of birds neither harms nor seriously alarms them. In fact, a bird-trapping and banding station may be beneficial to birds, and serve as the direct cause of a local increase in their numbers. The supply of food continually renewed at the traps and the constant guard that is kept against the incursions of cats and other enemies render the vicinity of such stations an effective sanctuary.

Every bird bander becomes a zealous defender of his wards, and enemies soon learn that absence from his premises is the better part of valor, since trespassers often suffer death.

There is real danger to trapped birds if they are not well protected against prowling cats and dogs by a suitable guard fence or vigilant watch. Automatic traps are indiscriminate in their captures and at times take in undesirable visitors, such as red and gray squirrels, ground squirrels, small rabbits, rats, mice, house cats, small skunks, and snakes. A five-foot rattlesnake was found in a Quail trap in Georgia.

Trapping and handling creatures as delicate as birds for a time raised antagonism in the minds of many bird lovers, but the experience of one woman who is



Photograph by P. Kuntz

A MEDLEY OF BIRD POSES

The friendly confidence of birds about a banding station is well indicated by the Pine Grosbeak and Goldfinch feeding together on an operator's hand. A Chimney Swift, like the one lying hypnotized in the center picture, returned to the station where it was first banded and was recaptured there for eight years. The bird in the lower illustration is a Ruby-throated Humming Bird that has been banded, and is lying quietly in the open palm before taking flight.

an ardent protectionist is typical. At first she opposed banding as likely to be dangerous to the birds. As her interest increased, however, she began trapping and banding, with the result that she is now convinced of the harmlessness of the operation.

During his bird-banding operations Mr. Baldwin (see text, page 95) has handled trapped birds more than 40,000 times, and has had only four or five accidents.

The constant recapture of the same birds indicates that they do not consider the traps dangerous. In fact, the persistence with which certain individuals reënter traps in search of food might raise doubts in the minds of the moralists as to the dangers of pauperizing our feathered friends by the varied and appetizing banquets always to be had within the traps. Certainly life is made easy for a varied host of birds at nearly 1,200 places of entertainment in this country.

### BUTCHER BIRDS MOLEST TRAPS

With the possible exception of the house cat, the Shrike, or Butcher Bird, is perhaps the most dangerous enemy of birds in and about traps at banding stations. The Common Shrike in the United States is a beautiful bird, with

gray back, white underparts, and black wings, which, when spread, show a large white patch in the middle (see page 109).

These markings, together with size, give the Shrike so much general resemblance to Mocking Birds that it is sometimes mistaken for this songster. There the resemblance ends, however, for the broad, black band on each side of the head, the hooked, raptorial beak, strong claws, and fierce courage characterize this little buccaneer.

It is unquestionably a far greater destroyer of small birds than is commonly appreciated. When in the neighborhood of a banding station it quickly notices the concentration of birds there and promptly proceeds to take advantage of its opportunity.

Sometimes a Shrike even enters the trap to get at the captives. More commonly it alights on or hovers about the wire meshes of the cage, until the birds within develop an uncontrollable panic and thrust their heads against the meshes to try to escape. Then it seizes a head in its claws and promptly pulls it off or lets the bird fall back dead. Needless to say, when found about a banding station Shrikes usually have short shrift.

### NUMEROUS SPECIES ENTER THE TRAPS

By establishing a series of automatic traps at the same station, which may be visited at frequent intervals, the number of birds captured in a day may vary from a few individuals to more than 200. Such captures may include a considerable variety of species. At the station near Thomasville, Georgia (see, also, text, page 95), 37 were taken one year between January and April, including such diverse kinds as the Sparrow Hawk, Mourning Dove, several kinds of Woodpeckers, Blue Jays, several kinds of Sparrows, Cedar Birds, several different Warblers, Ruby-crowned Kinglets, Hermit Thrush, Mocking Bird, and others.

Occasionally recaptures of banded birds occur under circumstances which add the zest of amusing unexpectedness to ordinary routine. A banded bird is recaptured, its number recorded, and upon release it almost immediately reënters the trap! Or the observer may find it a short time later awaiting him in a neighboring trap.

Photograph by S. Prentiss Baldwin

A GROUP OF CAPTIVE CHIPPING SPARROWS

These little birds are well loved in eastern North America. They exhibit a strong confidence in the friendliness of man and seem to prefer to be around or near his habitations.

As a result of the abundance of food and protection from harm, many small birds get the trap habit. Brown Thrashers usually dash about trying to escape, but one of these birds which was captured at intervals during five different years at the Thomasville station became so trapwise that eventually he came to consider one trap as his headquarters. Sometimes he took his noon siesta in it, with his head turned back on his shoulders, and had learned to find his way out of the Sparrow traps when he had satisfied his hunger.

On one occasion this bird was taken two miles away to be photographed, and then liberated. Eight days later he was back at the trap. His sense of ownership was so great that he persistently drove other birds away, and finally had to be removed so the trap might function. He was carried off and liberated so far away that he did not return.

### TRAPS USED AS SUMMER RESORTS

One Chipping Sparrow at Thomasville was caught in the same trap 54 times during one season. A Fox Sparrow has a record of being caught 165 times during one winter. At Crystal Bay, Minnesota, a Song Sparrow entered and was taken from the trap 55 times between April 14 and 30; in May it was caught 106 times;

Photograph by S. Prentiss Baldwin

HOUSE WRENS ARE WELCOME NEIGHBORS

Cheery and friendly, these sprightly little songsters will nest near a human habitation whenever given any encouragement. A wooden box or an old tin can with a hole small enough to exclude English Sparrows will serve as a home for Mr. and Mrs. Wren.

during the first four days of July, 14 times. After an absence it returned July 8 and in the following ten days it was caught 47 times. On July 17 it was carried half a mile away and in 20 minutes was back in the trap from which it had been taken. The following day it repeated this performance six times and twice on the 19th, after being carried off and released at a distance of two miles.

At Thomasville a pair of Myrtle Warblers developed the trap habit and were retaken 30 times during each of two seasons, both birds usually being in the trap together.

Sparrows and most other seed eaters are ground feeders. Traps placed in spots they frequent are usually successful, but even Sparrows may discriminate and not enter a trap placed in a seemingly proper spot, although they will enter it readily when it has been moved to a location only a short distance away. At other times one of a pair will freely enter the trap, while its mate persistently avoids it.

The capture of various Woodpeckers and other tree-climbing birds presents a different problem, and traps for them must be attached to the tree trunk and baited with a different kind of food. Varying food preferences of birds call for all the knowledge of the operator on the subject. In one instance much effort was spent in unsuccessful attempts to capture Cedar Birds until pieces of apple were tried for bait and the problem was solved.

RESULTS SURPRISE BIRD BANDERS

The variety of species that may be trapped explains much of the interest in bird banding. An operator at Sault Ste. Marie in 1925 trapped and banded more than 2,000 birds, representing 32 species, 13 of which were Warblers. All were captured within 50 feet of his dining-room window.

At a station in Pasadena, California, 1,984 birds of 38 different kinds were trapped. Surprising numbers of species of Warblers, with most diverse habits, have been captured and banded, including the lovely Prothonotary, the Black-throated Blue, the Nashville, and the exquisite Blackburnian. Several species of Vireos have also yielded to the call of the

Photograph by S. Prentiss Baldwin

BORN INTO "BANDAGE"

These baby House Wrens were banded before they were ten days old. There appear to be no set rules governing family relations among Wrens. Sometimes the male remains and assists his mate in feeding and caring for the young; at other times he promptly deserts his family.

bait in traps and have departed carrying their identification bands.

### THE HOUSE WREN IS INCONSTANT

It has been the common belief of numerous bird lovers that many, if not most, birds mate for life. When an observer notes the arrival of a nest-hunting pair about a box or other breeding place that was occupied by birds of the same species during the previous season, he usually assumes that these are the identical birds of the previous year, and thus the marital fidelity of our feathered friends comes in for commendation.

So far as the House Wren is concerned, Mr. Baldwin's observations of banded birds wreck this beautiful myth. He proves that not only do these birds commonly change their mates at different seasons, but that the female Wren may divorce the mate with whom she raised one brood in spring and rear another brood the same season with a different mate. The male in such case promptly consoles himself with another charmer and rears his second brood, frequently in a closely neighboring nesting place. At other times the male is the unfaithful one and departs with a new mate.

These observations are based on the repeated recapture of banded birds on their nests, with records of their numbers made each time. In one case a mated male apparently became interested in another female, but before the affair reached the serious work of actually rearing a second brood, he returned and resumed his duties with the mate with whom he had reared the first brood that season.

Owing to rematings among Wren families, it is a complicated process to keep track of their relationships. An accurate record of three generations of House Wrens in one limited locality needs the services of a skilled genealogist.

### WRENS DO NOT OPPOSE DIVORCE

No evidence of polygamy has been found among House Wrens, but they appear to have a modern conception of divorce. Sometimes they remate a second season, but not often. More frequently they remain mated for a second brood the same season. Apparently still more frequently a new mating takes place after the first brood is reared.

Photograph from Francis H. Herrick

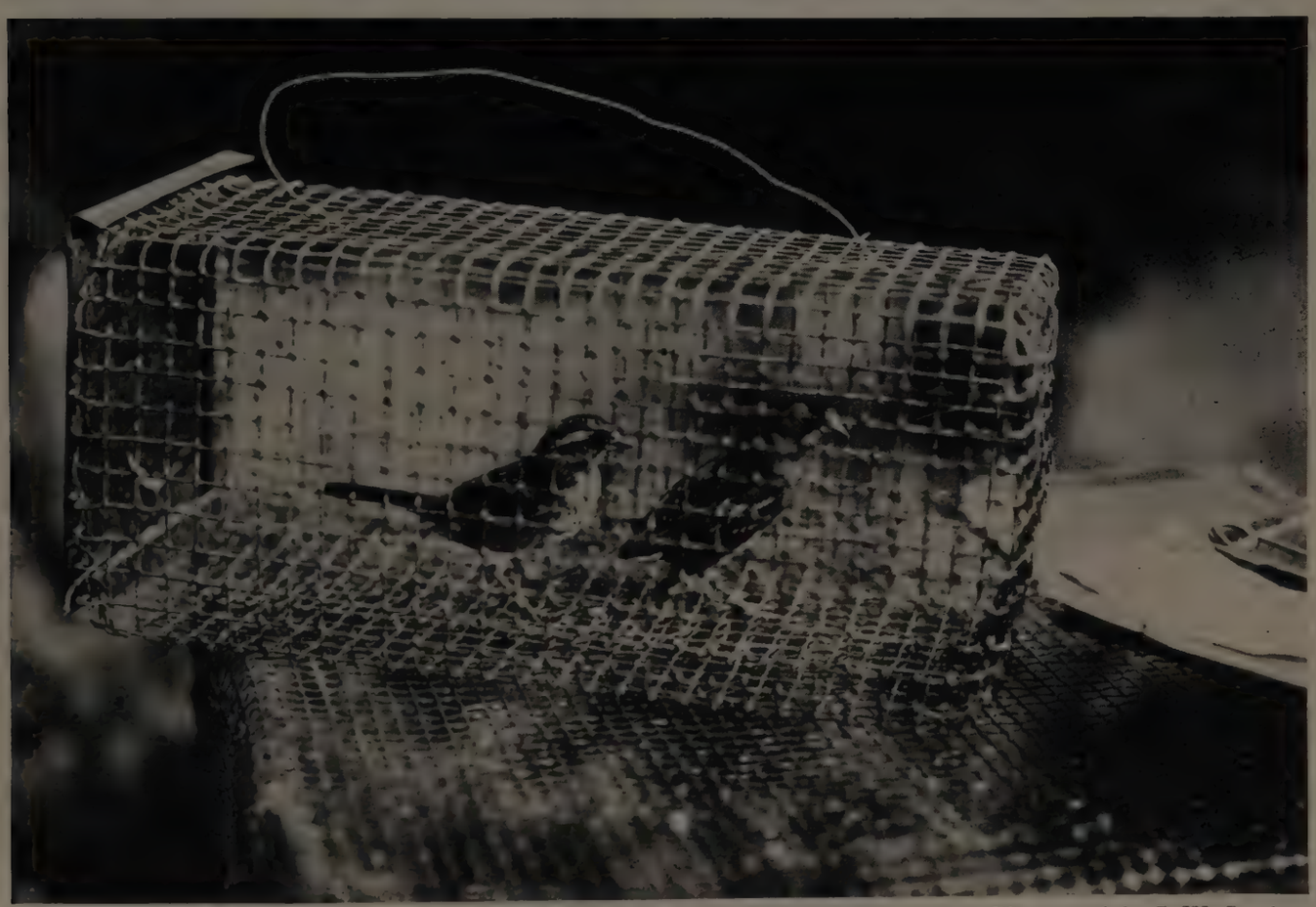
"JOVE'S BIRD" NESTLES NEAR THE SUN

Perched high in the top of an old tree or on a ledge of some precipitous crag, the Bald Eagle builds his eyrie. It is his castle, to which he adds year after year, and where successive generations of Eaglets are reared.

Photograph by S. Prentiss Baldwin

THIS MASKED MARAUDER IS A FIERCE DESTROYER OF SMALL BIRDS

The Shrikes are, perhaps, better known as "Butcher Birds," and they well deserve the name. Voracious feeders, they live on small birds, mice, small snakes, lizards, and insects. They frequently kill more than they can eat and hang the surplus on a convenient thorn bush.



Photograph by J. W. Stack

TWO WHITE-THROATED SPARROWS AWAIT THEIR BANDS

Although among the sweetest and most plaintive of singers, the "White-throat" is not too well known, for his favorite summer haunts are in northern forests. His voice is not his only claim to distinction, however, since he is also one of the handsomest of the Sparrows.

Photographs by S. Prentiss Baldwin

HYPNOTIZED, OR JUST "PLAYIN' POSSUM"?

When held in the hand for a short time and then turned over on their backs, birds appear to be affected hypnotically. Practically all species react similarly, but some are slower than others in becoming quiescent. They remain quite rigid for from a few seconds to several minutes and then dart away. From top to bottom, the birds shown here are a Mourning Dove, Blue Jay, Cardinal, and Brown Thrasher (see text, page 116).

The detailed accounts of the family affairs of the House Wrens at Hillcrest, Ohio, give a good idea of the information that can be gathered through bird banding. Similar methods can be used with other species, although not usually to so great advantage, owing to the number of pairs of Wrens that nest in this limited area.

At Hillcrest, the male Wrens usually arrive in advance of the females in spring and each locates what he considers a satisfactory nesting box, in which he places the foundation for a nest. He then guards the premises, singing at intervals while awaiting the arrival of the females. They appear soon after, and seem to give more weight to choice of location and character of the nesting boxes than to choice of husband. This was shown conclusively in one series of observations.

Photograph by S. Prentiss Baldwin

THIS CARDINAL IS HOLDING MORE THAN HIS OWN

Trapped Cardinals often squeal shrilly when they are approached and if taken in hand fight vindictively. In the instance photographed the bird was so absorbed in punishing its captor that after being banded and freed it hung on to the finger it was biting for sometime without any effort to escape (see text, page 116).

For two or three weeks a male occupied a nesting box, No. 53, on the outside wall of the library at Hillcrest. One morning he sang with unusual vigor and showed great excitement. A female was examining his nest box. At 7 a. m. the trapdoor of the box was closed and the band on the leg of the captured female was read.

Four hours later, when the observer was passing nest box No. 47, attached to the walls of the garage, its male proprietor showed similar excitement over a female that was going in and out of the box and otherwise indicating that she was inspecting the premises. She was trapped and her band proved her to be the same bird noted earlier in the morning at box 53.

At 4 p. m. the same day she was caught at nest box 49, halfway between the other boxes, where she was examining the premises held by a third male. By the next morning she had settled down contentedly and begun her honeymoon with male number four at box 26, attached to the outer walls of the sugar house. This was the final choice and there she raised her family.

There appears to be no set rule governing family relations among Wrens. Some-

Photograph from U. S. Biological Survey

A BIOLOGICAL SURVEY SHELTER FOR BANDING YOUNG HERRING GULLS

As a result of the bands placed on Gulls in northern Lake Michigan, their wanderings have been traced to the mouth of the St. Lawrence River, down the Atlantic coast, the Mississippi Valley, and into central Mexico.

Photograph from S. Prentiss Baldwin

"A BIRD IN THE HAND"

Experience in bird banding has developed a technique of handling that is easy for the bird. The method shown here was developed by an operator who has handled birds more than 40,000 times. The bird is a Towhee.

Photograph from S. Prentiss Baldwin

AN AUTOMATIC TRAP THAT WORKS

Mr. S. Prentiss Baldwin (see text, page 95) is driving the birds into a small "gathering cage," which enables the bander to take the birds in hand without the difficulty and danger to them that are attendant on their seizure in the traps.

Photograph from U. S. Biological Survey

GIVING BOBWHITE A FREE BRACELET

This trap, which was designed especially for taking Bobwhites, has a layer of cloth placed several inches below the wire top in order to prevent the birds injuring themselves in their efforts to escape. Mr. Herbert L. Stoddard is shown banding one of his cheery little neighbors.

© W. J. Jaycock

TREADING WATER, MALLARD FASHION

Occasionally, after swimming about on the surface of the water for a considerable time, these Ducks stand erect for a moment and fan their wings rapidly, apparently for the same reason that people yawn and stretch after sitting long in one position.

Photograph from U. S. Biological Survey

MALLARDS AND PINTAILS IN A WIRE-MESH TRAP SET ON THE ICE

Pintails are trimmer than most other Ducks, with longer, slimmer necks and a more elegant and dignified carriage. They are extremely shy and quick to take alarm and, not possessing any great degree of curiosity, they are not easily fooled by decoys. This baited trap was about 100 feet long and in one day caught 414 Ducks.

Photograph by W. J. Jaycock

A HAPPY FAMILY OF MALLARDS

Probable ancestor of the common barnyard Duck and most numerous and popular of our American "quackers" is the Mallard. Feeding almost entirely on vegetable matter and with a special penchant for wild rice when available, it constitutes food par excellence.

times the same pair remain united and raise two or three broods in a season. Again, they remate indiscriminately. Ordinarily, only two sets of eggs are laid and two broods raised, but if one set is destroyed a third may be laid. Sometimes the male remains and assists the female in feeding and caring for the young; at other times he promptly deserts the family.

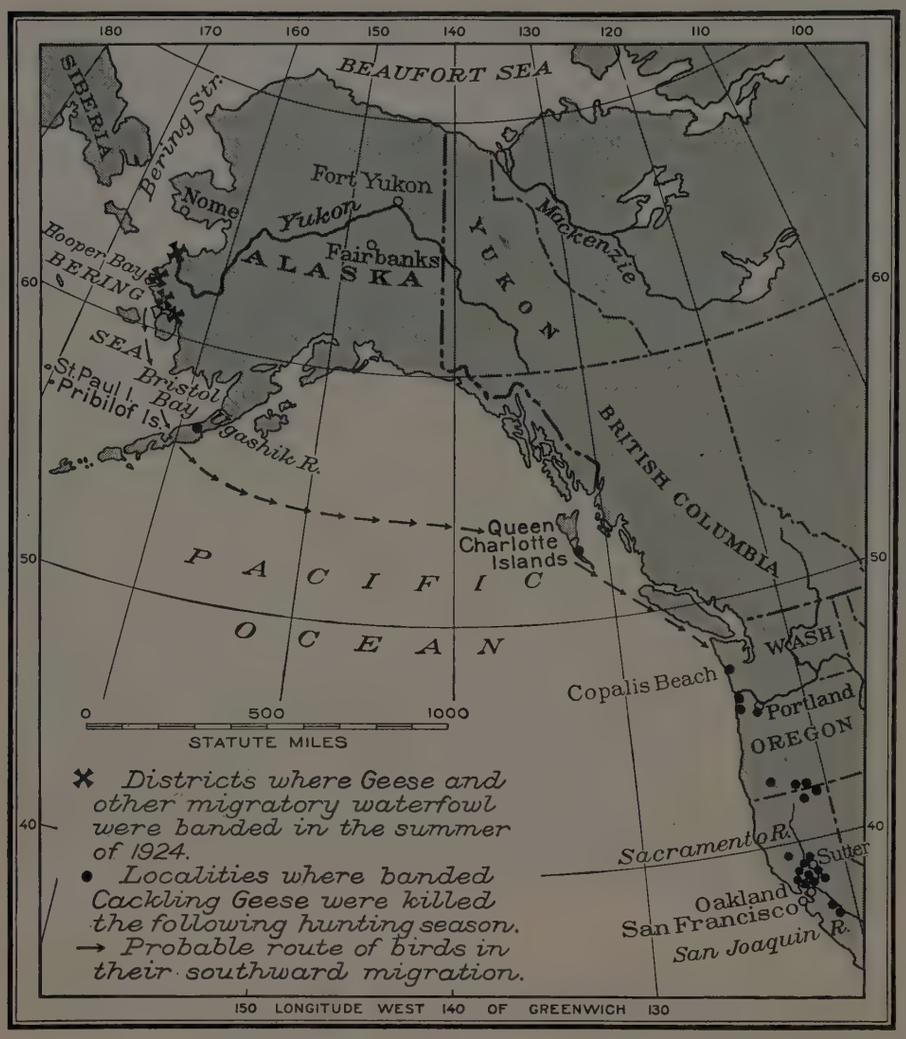
One remarkable outcome of these studies of Wrens during a period of years is that not in a single instance has any mating between parents and their banded young occurred. Father and son occasionally take the same wife at different times, but apparently there is no mixing of close blood relatives. This is an unexpected situation, in view of the general mixing up of the individuals of the species in areas where they are as plentiful as at Hillcrest.

What becomes of the surplus young hatched in a locality is still an unsolved problem. Comparatively few of the young Wrens banded at Hillcrest are retaken in succeeding years. Observations of the banded birds indicate that, as soon as they leave the nest, the mother leads them off to a considerable distance instead of keeping them about the vicinity where they were hatched.

This may be Nature's method of insuring the dispersal of the increase and preventing undue accumulation of individuals in one locality. The abundance of birds in any area commonly depends upon the food supply, and if the young were all to return to the vicinity of their birthplace the evils of overpopulation would soon arise. The fact that most birds appear merely to hold their own year by year, while they rear each season broods totaling from 6 to 12 among the Wrens, gives an idea of the heavy mortality suffered by them.

### BANDING ALARMS BIRDS VERY LITTLE

Among the interesting results of bird banding is the light that intensive work has thrown, not only on the mentality of different species, but also on differences among individual members of the species.




PROBABLE SUMMER MIGRATION ROUTE OF ALASKA GEESE

The birds' reaction to being caught and held in the hand and often having a band fastened to one leg shows that they are little alarmed. When released they frequently fly to the nearest branch, where they sometimes preen their disarranged plumage or break into song.

In one instance a Wren flew to a branch a few yards away, where it quickly spied, caught, and ate two small caterpillars. Chipping Sparrows are usually silent, but some utter a fine shrill squeal when taken in the hands, and others keep up a talkative series of chattering notes. A Towhee caught 30 times at Thomasville had the amazing habit of bursting into full song whenever taken in hand and continuing until released. One Myrtle Warbler that was trapped six times invariably squealed from the moment it was caught, although not one of the 200 others of its kind taken in the same way made the slightest outcry.

Cardinals usually squeal when the observer approaches the trap in which they are confined. They fight viciously, pecking and biting the fingers that hold them. One Cardinal was so engrossed in the fray that, when the hand was opened to free him, he gave a last and especially vigorous bite to one of the fingers, then flew to a small tree a few yards away and broke into lusty song, evidently rejoicing at having defeated and escaped the enemy (see page 111).

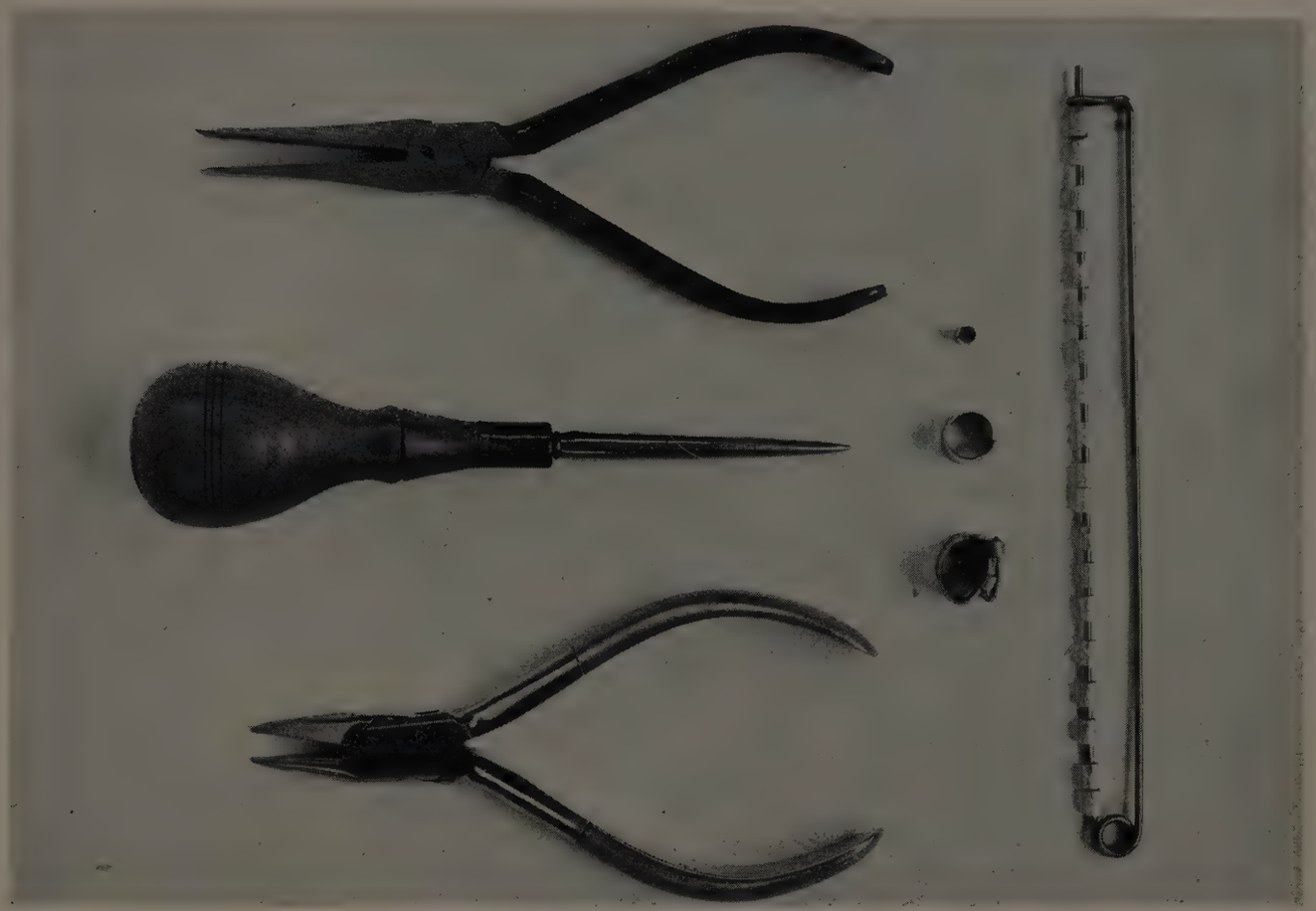
Occasionally, however, one remains perfectly quiet and passive, and when released appears undisturbed by the experience. At times even such seed eaters as Chipping and White-throated Sparrows are belligerent and peck at the hand holding them.

The individual bird that shows unusual mental characteristics of any kind always gives the same reaction when caught at other times, even when a year has elapsed. Woodpeckers and Blue Jays fight viciously, but, like other small birds when released, show little alarm and commonly alight near by, resuming their affairs as usual.

### BANDED BIRDS "PLAY POSSUM"

One mental trait appears common to practically all species of birds being trapped. When held in the hand for a short time and then turned on their backs, they usually lie quietly with closed eyes, often for several minutes, on the open palm. Then like a flash they turn and fly off. The various species show a marked difference in the readiness with which they yield to this apparently hypnotic state, and a dissimilarity in this also appears between individuals of the same species.

Chipping Sparrows are probably the most willing to take this pose. Not only will a single bird lie in this manner, but



Photograph from U. S. Biological Survey

THE BIRD BANDER'S TOOL KIT

Equipment for banding birds includes one of two forms of pliers, a small awl to thrust into and open a band when needed, and a set of serially numbered bands to fit the legs of birds of different sizes. A strong wire, bent into the form of a long, slender safety pin, is very useful for stringing the bands in their numbered sequence, so the next in the series is always available. These bands bear on the outside the words "Notify Biol. Surv.," below which is the number. On the inside of the band are the abbreviations "Wash., D. C."

also two (see illustration, page 118). An instance is recorded in which four Chimney Swifts being banded were laid out side by side on their backs on a board until a gust of wind disturbed them and they were gone.

Wild Ducks remain quiescent in the same way. On one occasion a Duck was laid on its back, with its head hanging down the side of a box, while another was being banded. Afterward it was picked up and also banded.

In holding birds in my hand to induce this pose, I found that at first there was a tendency to struggle, especially at the time the bird was turned on its back. Its eyes opened and closed rapidly, then more slowly until they remained almost shut as the bird yielded. Suddenly they opened wide and immediately it darted away. Whether this is the regular course in such cases remains to be proved by further observations.

It has been suggested that the reason for this pose is that the birds' sense of balance is upset in turning them over. This does not appear to be a satisfactory explanation. Not infrequently a bird, after being held firmly in a sitting position in the hand, remains immovable with its eyes partly closed for some time after the hand is opened and it rests on the flat palm.

## HOW LONG DO BIRDS LIVE?

Bird banding is yielding some vital statistics as to the life terms of the various species. The accumulation of this information will unquestionably clarify a number of points of great interest, one of which concerns the enormous mortality among birds. The vast proportion of the local birds banded are never retaken. The reappearance of only a small percentage of such birds indicates that probably a large number of those missing fell victims to the innumerable dangers that beset them.

Photograph by S. Prentiss Baldwin

A YOUNG CHARMER

The two Chipping Sparrows have succumbed to the hypnotism of being placed on their backs, but will depart very suddenly when they come out of their trance (see text, page 116). They are among the easiest species to be thus charmed. When taken in the hands, most of these birds remain silent; others squeal shrilly.

At Thomasville a Brown Thrasher was banded and recaptured for eight successive years. A Blue Jay was taken there six different years, and Wrens four years in succession. At Hillcrest a Chimney Swift has been caught in the same chimney for eight years. A Black-crowned Night Heron was taken six years after it was banded.

A Pintail Duck, helplessly sick from alkaline poisoning in the Bear River Marshes of Utah, was cured and banded by Dr. Alexander Wetmore during the autumn of 1914. Twelve years later it was killed in southeastern California, having escaped the perils confronting its kind for a longer period than is on record for any other banded bird.

### BANDING THROWS LIGHT ON BIRDS AS TRAVELERS

The returns of bands from points where the birds wearing them have been captured or killed are illuminating as to the travels of individuals of the different species.

A Chimney Swift banded near Thomasville, Georgia, in October, 1924, was taken at East Kingston, New Hampshire, June 15.

A Purple Finch banded at Pasadena, California, in March, was captured far to the north, at Porter, Washington, in June of the same year. Before this it was believed that the Purple Finches frequenting the lower elevations of southern California in winter were those living during the summer in the higher elevations of the neighborhood mountains. The travels of this bird may be an indication that all the southern Purple Finches move southward each winter and are replaced by those from farther north.

A Robin banded in July at Crystal Bay, Minnesota, was taken more than a year later at Pachuca, on the southern border of the Mexican tableland. A Double-crested Cormorant banded in July on an island in Quebec was shot the following December ten miles from Lake Okeechobee, Florida, and proved to be the first record of this species in that State.

One return is of extraordinary interest. A Common Tern and 100 unfledged young of its kind were banded in 1913 on Muscongus Bay, Maine. Four years later a negro paddling a canoe on a branch of the Niger River, on the West Coast of Africa, found a strange white bird floating dead in the water, with a metal band on one of its legs. He took it to a missionary, and thus the band and the record came back to the Biological Survey.

Two Caspian Terns banded at a bird colony on Lake Michigan in 1923 were captured a year later in Nova Scotia. No doubt they had gone to the South Atlantic or Gulf coast for the winter and then joined their fellows moving up the Atlantic coast to new haunts, instead of returning up the Mississippi Valley to their birthplace. Three others banded at the same colony were recovered in Colombia, South America.

Photograph from W. I. Lyon

BEING BANDED DOESN'T SEEM TO ANNOY THIS YOUNG HERRING GULL

All Gulls fight when picked up. Grown ones continue their resistance until released, but the young ones soon cease to struggle and take their temporary captivity philosophically. Mr. W. I. Lyon, the operator, is secretary of a large bird-banding organization.

A Great Blue Heron banded at Waseca, Minnesota, was killed near Gatun Lake, in the Canal Zone. A Snowy Egret banded on the Bear River Marshes of Utah was taken more than six years later in central-western Mexico. A White Pelican banded in the Yellowstone National Park was killed in the State of Vera Cruz, Mexico.

The Biological Survey has banded migrating wild fowl on a considerable scale in the famous Bear River Marshes of Utah, during September and October from 1914 to 1916. Nearly 1,000 Ducks belonging to nine species were thus marked. Of these 174, or about 17 per cent of the number banded, were recovered at points as far east as Kansas, south into Mexico, west to California, and north into Canada.

Such dispersal proves that these marshes serve as congregating places for migratory wild fowl journeying down from far-northern breeding grounds, and that on the approach of winter they move on to warmer regions, including California. Ap-

Photograph by Herbert

DINING ABUNDANTLY AND OFTEN ARE THE CHIEF CONCERNS OF A GULL

The birds are attracted here because of the excellent feeding afforded them by the fishermen, who habitually throw back into the sea the inedible portion of their catches.

parently, they reverse the movements in the spring.

### SOME BIRDS MIGRATE AT A TANGENT

The startling fact developed by the flight of the banded Ducks from the Bear River Marshes was that many of them go westerly over the deserts of Nevada and across the Sierra Nevada to winter in California; others move east or southeast across the Rocky Mountains.

The recovery of banded birds in California in the winter, following their banding on the Bear River Marshes, proved that a considerable percentage of the Green-winged Teal, Shovelers, and Pintails gathering in the Utah marshes in autumn cross to California to spend the winter. Such cross-country flights to the east and west were previously unsuspected, and prove that the migrations of many waterfowl do not always follow the more or less definite northerly and southerly routes.

The autumn flight of banded birds breeding in these marshes appears to be similar to that of the visiting migrants.

More than 19,000 Ducks have been banded at various points in the Mississippi Valley, at Lake Scugog, Ontario, and elsewhere. Of these some 4,000 have been taken subsequently at many widely scattered localities. It is worthy of note that the returns of banded Ducks vary from about 15 to nearly 20 per cent of the number banded at the different localities.

A Pintail banded at Ellinwood, Kansas, in March, 1925, was shot in Butte County, California, in December of the same year. A Blue-winged Teal banded at Lake Scugog, Ontario, in September, was shot at Port of Spain, Trinidad Island, off the coast of South America, 67 days later.

These returns, combined with those from the Ducks banded on the Bear River Marshes, indicate that each of the important areas to which wild fowl resort in large numbers in the United States is vitally important to the maintenance of our local supply of these birds, as these central areas serve as distributing reservoirs for the surrounding States.

That a single migratory game bird may, as its fancy dictates, sojourn parts of each year in widely separated States makes it evident that State laws alone for the conservation of such species are fruitless and that the Nation must act in the matter. This emphasizes the wisdom of the Migratory Bird Treaty and the Federal laws for the protection of migratory birds.

### BREEDING PLACES OF MIGRATORY WILD FOWL SHOULD BE SAFEGUARDED

Migrating, however, is only one of the doings of birds. They frequently need a meal; like other creatures, they occasionally wish to rest, and unless there is to be race suicide, they must find nesting places. These facts make it clear that the important water areas to which they resort in large numbers must be conserved and perpetuated. Efforts to protect the birds are of little avail if we do not at the same time save sufficient water areas for their present and future welfare.

Migratory wild fowl are known to breed all across the northern part of the continent and on adjacent islands from Bering Sea to Baffin Bay. Since any adverse conditions affecting them on their breeding ground will decrease the numbers that visit us in winter, they must be properly safeguarded there, as well as on their wintering grounds, in order that we may be successful in perpetuating our wild fowl. The banding of wild fowl on their nesting grounds is the only method by which the breeding places of those wintering in the different parts of the United States and Mexico can be determined.

It is a practical certainty that about two-thirds of the wild Ducks and Geese of North America winter in the southern half of the United States and on the Pacific coast. The maintenance of our supply of these birds is dependent upon the practical and effective nature of the measures taken for their conservation.

### BANDING EXPEDITIONS SENT TO BREEDING GROUNDS

Several years ago the Biological Survey developed a program of sending expeditions to important breeding grounds of wild fowl all across the northern part of the continent. It planned to provide, through banding, the knowledge needed as to the origin of the supply of our migratory wild fowl and their dispersal from these points. This information will not only be of the greatest interest to sports-

Photograph from the Milwaukee Public Museum

SANDPIPERS PLAY TAG WITH THE WAVES ON THE WIND-SWEPT SHORES OF LAKE MICHIGAN

These extremely gentle little birds can be seen in the spring and fall running out in the wake of a wave to salvage some titbit from the wet sands, and retreating hurriedly as a new incoming breaker threatens to submerge them. They are not very fearful of man and offer a pitifully easy prey to the gunner, who hunts them despite their very small size. Along the far side of this inlet may be seen a series of wire-netting traps used to secure Sandpipers for banding.

men and conservationists, but will form the basis for far more intelligent work for conserving these birds than now is possible.

The first expedition was a coöperative one organized by the Biological Survey in 1924 to visit the tundra about the head of Hooper Bay, Alaska, immediately south of the delta of the Yukon River. The expedition was led by O. J. Murie, a field naturalist of the Biological Survey. The party included two other naturalists, H. W. Brandt, of Cleveland, and H. B. Conover, of the Field Museum of Natural History, Chicago, and was joined in the field by Frank Dufresne, of the Biological Survey. They reached Fairbanks on March 18 and soon after, with three sleds and dog teams, traveled to their destination across 700 miles of snow-covered country. This trip required hard work, but was accomplished without other mishaps than a temporary attack of snow-blindness suffered by two of the members.

### ARCTIC BANDINGS YIELD SIGNIFICANT RETURNS

The party assembled May 1 at Hooper Bay, on the broad, treeless tundra bordering the coast of Bering Sea, to await arrival of the wild fowl. At first a belt of shore ice lay along the coast, but as it broke up the northward migration of vast numbers of wild fowl passing near the mouth of the bay was the expedition's most thrilling experience. This district had never been visited before by naturalists during the breeding season, although it was first explored and mapped by the writer during the winter of 1879 (see page 127).

As anticipated, it proved to be a marvelous gathering place for breeding wild fowl in great variety. Cackling and Emperor Geese abounded, but the White-fronted species was found sparingly. Whistling Swans, several species of Eider and other Ducks, with many kinds of waders, including Golden Plover, Pacific Godwits, Long-billed Dowitchers, and too many others to mention, kept the party at high tension amid the amazing number and variety of songs and maneuvers which endow these northern breeding places with the most intense interest through the mating season.

The banding of the Ducks and Geese by this party was the first attempt of the kind on one of the great northern breeding grounds, and the percentage of these birds taken on their southward journey during the following autumn and winter exceeded all expectations. Of three species of Geese, 213 were caught and banded, in addition to nearly 50 Ducks, and various other birds.

Of these, 153 were Cackling Geese. This is a very small geographic race of the well-known "Honker" (Canada, or Wild Goose), whose clanging notes, as their V-shaped flocks pass high overhead in the migrations, are so familiar to many in the eastern United States. Thirty-nine were killed within a few months and the bands sent to the Biological Survey.

Their capture clearly indicates their line of flight and wintering grounds. The first was reported from the Ugashik River, emptying into Bristol Bay, Alaska. The next came from more than 1,200 miles away across the open sea on one of the Queen Charlotte Islands, British Columbia. Another was taken on the Copalis Beach in Washington, others in Oregon, and then a considerable number in California, where most of these birds appear to winter in the marshes of the Sacramento and San Joaquin Valleys. A White-fronted Goose banded on July 15 was taken January 1 at Sutter, California. Banded Pintails were also taken in central California.

Such gratifying returns from this first bird-banding expedition in the north gave strong encouragement to further efforts of the kind.

### EXPEDITION SENT TO YUKON BOUNDARY

Many years ago, when Thomas Riggs, later Governor of Alaska, was in charge of the International Boundary Survey between Canada and Alaska, he found many Geese breeding in the flat valley of the Old Crow River, near where it crosses the boundary, about halfway between the Arctic Circle and the Arctic coast. This area, never visited by a naturalist, afforded another opportunity for work in practically new country, where bird banding on a considerable scale might be done.

In the spring of 1926, the Biological Survey detailed Mr. Murie to visit the

Photograph by Herbert K. Job

ROYAL TERNS ARE GREGARIOUS BIRDS

Breeding in great colonies off the South Atlantic coast and the shores of the Gulf of Mexico, these birds nest so close together that it is difficult to walk through their breeding grounds without treading on the eggs.

breeding grounds there and to band as many wild fowl as practicable. At the same time he was to secure specimens of the wild life of this unknown area.

He proceeded early in the spring from Washington to Fairbanks, Alaska. Immediately after the ice broke up on the rivers he went to Fort Yukon and engaged an assistant with a motor boat. Taking in tow a small barge loaded with gasoline and other necessary supplies, they set forth on the long trip into an uninhabited and little-known wilderness.

The expedition was successful. In addition to gaining a great store of information concerning the wild life of the region, Mr. Murie placed bands on a number of Geese and other birds. During the succeeding autumn, three of the Geese were taken in western Alberta, Idaho, and Nevada, indicating a strong probability that the wild fowl on the eastern border of Alaska also winter west of the 100th meridian.

Records from the banding of Ducks on their breeding grounds and at their other great gathering places are yielding a harvest of valuable information.

### MIGRATORY WILD FOWL OF THE UNITED STATES FORM TWO DISTINCT GROUPS

The returns demonstrate that migratory wild fowl in the United States, both those breeding here and those which visit us during the migration and winter, are separated into two well-marked groups: those of the region extending from the western Dakotas, western Kansas, and western Texas to the Pacific, and those which occur from the eastern Dakotas, eastern Kansas, and eastern Texas to the Atlantic.

The two areas occupied by these separate groups correspond to the arid western region and to the more humid eastern part of the continent. The 100th meridian of longitude, a commonly accepted dividing line between the arid West and the more humid East, appears to be well located for marking the boundary between these areas.

The accompanying map (see page 116)

Photograph from U. S. Biological Survey

YOUNG CASPIAN TERNS CORRALED FOR BANDING

This "haul" netted more than 700 birds. Returns from birds banded at this station in northern Lake Michigan have been received from as far south as Colombia and as far north as Nova Scotia.

shows in a diagrammatic way a few of the points where thousands of Ducks of various species have been banded and some of the points at which they have been subsequently taken. This evidence and additional facts of the same character obtained in this way strongly indicate that the birds of either the western or the eastern area might be practically exterminated without seriously interfering with the supply of birds in the other regions. This discovery is of the utmost importance in the development of the necessary conservation measures for perpetuating our wild fowl.

The number of returns of bands on birds found dead indicates the perilous existence of these habitants of field and forest. To the casual observer the birds' active movements, their songs and cheerful call notes, give the impression of a joyous life; yet birds live in the midst of deadly perils coming from many sources, and the mortality among them is enormous. In spite of many widespread disasters, however, the survivors appear to repopulate the stricken areas within a few seasons with their normal quota of bird life.

### STORMS DESTROY MANY BIRDS

Unseasonably cold storms during migrations probably destroy more individuals than any other single cause. Opportunity is occasionally presented for observing their effects on bird life. Dr. T. S. Roberts made a careful survey following a spring snowstorm in Minnesota and North Dakota, and found that vast numbers of Lapland Longspurs had perished there on their northern migration. Severe blizzards in the Middle East sometimes catch a host of Bluebirds and other small species on their way north.

Following such storms, holes in trees and nesting boxes are sometimes found full of the dead bodies of the little victims that have tried to get shelter and have perished from the cold.

Telegraph and telephone wires and other obstacles kill great numbers of birds, which fly into them not only at night but

Photograph from U. S. Biological Survey

THE SNOWY OWL AT HOME

In grace and speed of flight this bird is more like a Hawk than an Owl. So swiftly does it navigate the air that it can capture a Duck on the wing or a hare afoot.

Photograph by Paul W. Hoffman

BLACK TERNS NEST IN THIS MID-WESTERN, FRESH-WATER MARSH

This is one of the comparatively few long-winged swimmers in the United States that commonly nest far away from the sea. It prefers the reedy fresh-water sloughs and marshes of the Middle Western States. Note the adult Tern perching on the operator's head. It did this repeatedly during one visit to this breeding place, apparently considering the operator a part of the scenery.

ESKIMOS DRIVING WILD GEESE TO A BANDING CORRAL

The white-cheeked Cackling Geese are the smallest of North American Geese. The individuals showing white heads are the little-known Emperor Geese.

Photographs from U. S. Biological Survey

EIDER DUCKS SUPPLY WARM CLOTHING FOR THE ESKIMOS THAT LIVE HERE

The inhabitants of this semisubterranean village near Hooper Bay are among the most primitive of the native Alaskans. During spring and summer migratory wild fowl are one of their main sources of food supply, and the skins of Eider Ducks furnish material for much of their clothing. A bird-banding expedition from the Biological Survey made its headquarters in this vicinity in 1924 (see text, page 123).

Photograph by Sumner W. Matteson

MIGRANT WILD GEESE FLY IN SILHOUETTE ACROSS A NORTH DAKOTA SUNSET

© The Detroit News

WHISTLING SWANS ARE AGAIN BECOMING A FAMILIAR SIGHT IN PARTS OF THE COUNTRY WHERE THEY WERE ONCE NEARLY EXTINCT

These majestic birds have a wing-spread of from six to seven feet and can fly as fast as many an express train travels. The notes of large flocks of Swans gathered on the small lakes of their northern breeding grounds make a wonderfully impressive, deep-toned chorus.

Photograph by Guy Amsler, © Arkansas Game and Fish Commission

AN AËRIAL TRAFFIC OFFICER MIGHT FIND WORK HERE

Great flocks of Mallard Ducks that literally darken the sky still fly over parts of the United States at certain seasons of the year. From an economic point of view the Mallard is most important to the human race, both because of its vast numbers and its wide distribution

often in broad daylight. Formerly, when lighthouses cast steady beams of dazzling light athwart the sky, migrating birds dashed against the glass of the lights and perished in large numbers. This source of mortality seems largely to have disappeared in recent years, since the continuous light has been replaced in many instances by a series of temporary flashes.

To these dangers may be added the recurring periods of scanty food supply and the never-ending depredations of their bird and mammal foes, including man in the case of game species. Pollution of waters by various means and other man-made death traps also take their toll. With the multiplication of swiftly moving automobiles, enormous numbers of small birds haunting the highways in some districts are stricken down and their pitiful bodies lie flattened in the dust.

### CIVILIZATION AFFECTS THE BIRD POPULATION

It is comforting to know, however, that civilized man is appreciating bird life as never before and is throwing about the harmless or useful species the protection of the law. Furthermore, in the United States, Canada, and some other countries refuges, which already cover many millions of acres of forest and other lands, are being established in increasing numbers. In winter food and shelter are being provided, especially in times of stress, on a growing scale.

As a consequence of the changed conditions of the country through the clearing of primeval forests and the modern protection afforded birds in the United States, it is safe to say that there are now more small birds in North America than at any previous time in our history. On the other hand, our migratory wild fowl will never again equal the vast swarms that existed in the early days before enormous areas of water and marshlands were drained.

With so many opportunities to have little aluminum records carried by winged messengers to distant places, bird banding should invite the attention of all expeditions to the Far North and of research stations in regions where wild fowl, especially Ducks, Geese, and waders, breed in large numbers.

Capturing and banding of such of the breeding waterfowl and their young as winter in southern latitudes should also offer an interesting variation to the frequently monotonous everyday routine. Some of the banded birds would undoubtedly be taken later in lower latitudes, thus bringing word to the public of those in remote northern climes and adding valuable facts to our knowledge of the travels of feathered wanderers.

The Biological Survey will take pleasure in coöperating with sportsmen or future northern travelers who may be interested in this work. It will see that they are provided with necessary instructions, numbered aluminum bands, and other small equipment. If bird banding had been developed years ago, we might now have many precious records brought by birds from places in the Arctic regions visited by Greely, Peary, and other explorers.

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*Notice of change of address of your* NATIONAL GEOGRAPHIC MAGAZINE *should be received in the office of the National Geographic Society by the first of the month to affect the following month's issue. For instance, if you desire the address changed for your March number, the Society should be notified of your new address not later than February first.*

# PRESIDENT COOLIDGE BESTOWS LINDBERGH AWARD

## The National Geographic Society's Hubbard Medal Is Presented to Aviator Before the Most Notable Gathering in the History of Washington

FROM the hands of President Coolidge, Col. Charles A. Lindbergh, first to fly the Atlantic alone, received America's highest award to explorers, the Hubbard Gold Medal of the National Geographic Society, in Washington's largest auditorium, before the most distinguished audience ever gathered for such an occasion in the National Capital, on the evening of November 14, 1927.

The eminent jurists of the United States Supreme Court, virtually all the members of the President's Cabinet, and all the United States Senators and Representatives then in Washington; members of the Diplomatic Corps from all over the world in their full-dress regalia; ranking officers of the Army and Navy; the Director of the Budget; members of the Interstate Commerce Commission, and many other Government officials and noted scientists and private citizens formed the brilliant gathering which did honor to the 25-year-old hero, youngest man to receive the Hubbard Medal or any comparable honor.

### FAMOUS TRANSOCEANIC FLYERS PRESENT

With the modest young flyer on the platform, besides the President of the United States, were Mrs. Coolidge, Mrs. Lindbergh, Dr. Gilbert Grosvenor, President of the National Geographic Society, and Dr. John Oliver La Gorce, Vice President of the National Geographic Society. With them were the Hon. William P. MacCracken, Assistant Secretary of Commerce for Aëronautics, and the Hon. Everett Sanders, Secretary to the President.

Flanking this group were famous transoceanic flyers who had contributed epochal achievements to the aërial conquests of the oceans. And with the aviators sat Dr. Orville Wright, whom many of those present remembered meeting when that pioneer of the air was in Washington with his brother conducting the experiments which culminated in launching an airplane from a creaky rail at Fort Myer, Virginia, and thus inaugurating the science which thrilled the world when Colonel Lindbergh flew from New York to Paris.

Every seat in the Washington Auditorium was taken, police guards had to be thrown around the building to keep those from entering who did not have tickets, and six thousand members of The Society saw the historic ceremonies which were broadcast to millions of other Americans. For weeks the offices of the National Geographic Society were besieged for admission to the exercises, and a clerical force had been kept busy explaining to personal applicants, and answering thousands of letters from others, that the ticket supply had been exhausted when the 6,000th fortunate member of The Society had claimed the last available seat coupon.

The U. S. Army Band began playing at 8 o'clock and at 8:35 Colonel Lindbergh entered, accompanied by his mother and Dr. La Gorce. Ten minutes later, the President of the United States and Mrs. Coolidge came on the stage with Dr. Grosvenor. Dr. Grosvenor, in presenting the President, congratulated him, as Commander-in-Chief of all our air forces, on the amazing contributions of the Government's airmen.

### PRESIDENT COOLIDGE INTRODUCES COLONEL LINDBERGH

President Coolidge complimented Colonel Lindbergh's achievement in an address which was continually interrupted by applause, especially when he said that Colonel Lindbergh, after his flight, "determined to capitalize his fame, not for selfish aggrandizement, but for the promotion of the art he loves," and again when he referred to him as "this courageous, clear-headed, sure-handed youth, whose

Photograph by Benjamin A. Stewart

MEMBERS OF THE NATIONAL GEOGRAPHIC SOCIETY ARRIVING TO RECEIVE TICKETS FOR THE LINDBERGH RECEPTION

Long before the announced hour for the distribution of tickets, members of The Society began to gather before the doors of the headquarters on Sixteenth Street. Requests for more than 30,000 tickets were received. Disappointment of many was regrettable, but inevitable.

character had withstood the glare of publicity and the acid test of hero-worshiping adulation."

The President concluded by handing to Colonel Lindbergh the medal which has been bestowed on only seven other men in the 40 years of the National Geographic Society's existence and saying, "To-night I have the utmost gratification in awarding you this further recognition of achievement, the Hubbard Medal of the National Geographic Society."

Then occurred an incident which is virtually without precedent, when the President, in addition to presenting the Hubbard Medal on behalf of the National Geographic Society, paid the young explorer the gracious personal tribute of introducing him to the audience.

The applause which greeted the two figures on the platform, America's foremost hero and America's foremost citizen, persisted for several minutes before Colonel Lindbergh was able to make his acknowledgment. Meanwhile a battery of motion-picture cameras and news photographers added a picturesque touch by snapping photographs at high speed with a clicking that sounded like a miniature Battle of the Marne. The stage was illu-

minated by great flares, so that the historic scene might be recorded.

When Colonel Lindbergh was able to make himself heard he accepted the honor in a brief, graceful speech, and mingled laughter and applause greeted him when, after uttering only a few sentences, he said: "In closing. . . ."

Following Colonel Lindbergh's address, Assistant Secretary MacCracken summarized America's achievements in the air.

### DR. GROSVENOR PRESENTS THE PRESIDENT

Dr. Grosvenor, in presenting President Coolidge, said:

"Mr. President, Mrs. Coolidge, members of the National Geographic Society:

"During the last four years American navigators of the air, with bewildering rapidity, have made voyage after voyage of amazing importance.

"The first round-the-world flight, the first North Polar flight, the first circumnavigation by air of Central and South America, the first flights to Hawaii, the first flight from New York to Tokyo via Europe, the first, second, and third transatlantic flights from New York to Europe in one summer! And world records for altitude attained in a plane and for millions of miles flown with air mail without accident!

"To the greatest of these achievements the National Geographic Society has now assembled to pay tribute.

"In order that the acknowledgment to our dauntless young navigator may be truly national, our warm-hearted Chief Magistrate has generously honored us by his presence.

"In every one of these outstanding voyages, so fruitful in scientific knowledge, the aviators were men trained, developed, inspired in the Government Service.

"And so to you, Mr. President, the Commander-in-Chief of all of our air forces, whose clear, practical, constructive program has guided, encouraged, and stimulated an air conquest that is phenomenal, the members of the National Geographic Society throughout the Nation extend most earnest and respectful congratulations.

"Ladies and gentlemen, the President of the United States."

### PRESIDENT COOLIDGE LAUDS THE AIR HERO

President Coolidge spoke as follows:

"Fellow Countrymen:

"Transportation and communication are essential to civilization. Within the year an encouragement has been given to their development that has few parallels in history. The principles of aviation were demonstrated first by Americans at the turn of the last century. In the intervening years their science progressed, both here and abroad. Important flights were made.

"It remained for one of our own citizens in May, 1927, to arouse universal interest in the practical possibilities of travel through the air. His flight, alone and unaided, from New York to Paris thrilled the world. It appealed to the imagination of humanity. How the hero of this exploit was revealed, not as a reckless adventurer, but as an able, sober-minded, modest young man of high and unselfish purpose, has now passed into history. What he did to strengthen the cordial relations between our people and Europe is well known. The wonderful and sincere welcome he received abroad, the acclaim that greeted him at home, are still fresh in the public mind.

"But that was not all. With a clear conception of public service, he determined to capitalize his fame, not for selfish aggrandizement, but for the promotion of the art he loves. He was unmoved by the many opportunities for private gain. The flight to Europe was spectacular. It stirred the heart of the people. But foremost in his mind was the permanent good that might come from thus having directed public thought to human flight. This courageous, clear-headed, sure-handed youth, whose character had withstood the glare of publicity and the acid test of hero-worshiping adulation, became an apostle of aëronautics. He dedicated himself to advancing the science and practice of aviation.

"Taking little time to recover from the strain of his experiences, he started on a missionary tour of over 22,000 miles. Flying in his *Spirit of St. Louis,* the 'Spirit of America' visited 82 cities in our 48 States. Only once did he fail to arrive on

Photograph by Pacific and Atlantic

PRESIDENT COOLIDGE ADDRESSING THE NATIONAL GEOGRAPHIC SOCIETY ON COLONEL LINDBERGH'S ACHIEVEMENTS

Seated on the platform, front row (left to right), are: Dr. John Oliver La Gorce, the Hon. Everett Sanders, Secretary to the President; Mrs. Evangeline Lindbergh, Mrs. Coolidge, Dr. Gilbert Grosvenor, Col. Charles A. Lindbergh, and the Hon. William P. MacCracken. In the second row were Dr. Orville Wright, Mr. Harry F. Guggenheim, and the transoceanic flyers: Mr. William S. Brock, Mr. Emory Bronte, Miss Ruth Elder, Mr. Arthur C. Goebel, Mr. George Haldeman, Lieut. Albert F. Hegenberger, Lieut. Lester J. Maitland, Mr. Edward F. Schlee, Mr. Paul Schlueter, Lieut. Ernest L. Smith, Miss Thea Rasche, and Mrs. Clarence Chamberlin, representing her husband.

scheduled time, establishing a record for reliability. He spoke not about himself, but for airways and airports in 147 speeches and 192 messages dropped from the clouds. Because of what he has said and done we are told aëronautic plans for 1928 indicate an activity far beyond any dreams of six months ago.

"Col. Charles A. Lindbergh, it has been the privilege of few to do as much for a cause in so short a period of time. You have richly merited the many honors already bestowed. To-night I have the utmost gratification in awarding you this further recognition of achievement, the Hubbard Medal of the National Geographic Society."

### COLONEL LINDBERGH'S REPLY

Colonel Lindbergh spoke briefly in acknowledgment of the President's address.

In accepting the medal he said:

"Mr. President and Members of the National Geographic Society:

"First, I want to thank you all for the great favor which has been bestowed on me to-night. The National Geographic Society has aided greatly in the advancement of civilization and in the discovery of many parts of the world and in the upward trend of this country.

"It has been first in the field of exploration and has aided greatly in the development of aviation. In the past, in exploration especially, it required years for achievements that may be made now in hours. In the future it is the hope of the aëronautical industry that the airplane will do its part in discovery and in bringing together and uniting more closely the nations.

"In closing, I want again to thank you. I hope and believe that in the near future we will be flying over practically every corner of the world, and that the airplane

Official Photograph, U. S. Army Air Corps

AN ESCORT OF ARMY PLANES IN FLIGHT OVER WASHINGTON

The Washington Monument, in the right foreground, was the first object seen by Colonel Lindbergh as he approached the National Capital on the flight from Richmond near the end of his tour of the forty-eight States (see pages 1-46).

will unite more closely the nations than they are to-day."

### DR. GROSVENOR PRESENTS SECRETARY MAC CRACKEN

Introducing the Hon. William P. MacCracken, Assistant Secretary of Commerce for Aëronautics, Dr. Grosvenor said:

"Colonel Lindbergh's travels by air have done so much for 'the increase and diffusion of geographic knowledge'—the purposes for which the National Geographic Society was founded—that he will, we think, be interested to know that participating in the presentation of this medal are members of this Society residing in 169 countries and mandatories.

"Its membership reaches to the uttermost corners of the globe and even to its most isolated and remote islands.

"For instance, sharing in the pleasure of this award to him are 11,000 members in Australia and New Zealand, 200 in the Fiji Islands, 450 in Java and Sumatra, 10,000 in Central and South America, 28,000 in Europe, 50,000 in Canada, and more than one million members in the United States.

"Many thousands of members are listening in to-night, and to them The Society sends greetings (see text, page 139).

"I now have the honor to present the distinguished Assistant Secretary of Commerce for Aëronautics, the Honorable William P. MacCracken."

### "SINNER AND SAINT PRAYED FOR HIS SUCCESS"

Mr. MacCracken said:

"We have just been privileged to witness the conferring of the highest award which the National Geographic Society bestows upon explorers.

"The President had previously expressed the Nation's regard for its recipient and his great achievement, when he welcomed Colonel Lindbergh upon his return from France.

"An unknown civilian aviator, working for an air-mail contractor, he took leave to fly from New York to Paris. For 33 hours and 29 minutes he held the attention of the entire civilized world. Irrespective of nationality, creed, or occupation, sinner and saint prayed for his success. When at the end of their vigil he was acclaimed the victor, nations were brought to a clearer realization of the brotherhood of man, and the cause of civilian aviation was advanced to an extent which gold alone could never purchase.

"Great as his achievement was and deep as it endeared him in the hearts of his fellow countrymen, the conduct of Colonel Lindbergh since landing at Le Bourget has done more to inspire admiration for him and faith in the youth of to-day than did his flight itself.

"We in aviation recognize in the President one of the great men who has served this Nation as its Chief Executive. His keen interest in all phases of aëronautics has been in a large measure responsible for the progress made during the past few years. His recognition of these transoceanic flyers and their deeds is appreciated not only by them, but by all the aëronautic fraternity.

### AVIATION'S GIFT TO GEOGRAPHY

"We have foregathered here as members of one of the world's greatest societies. Its primary purpose, inspired by altruistic motives, is to collect and diffuse geographic knowledge. All forms of transportation have proven valuable adjuncts toward accomplishing these aims; but none has ever presented possibilities as great as those offered by aëronautics.

"Exploration and travel are indispensable to geographic education. Expeditions which heretofore cost months in time and much in human hardships and sacrifice can now be accomplished in a matter of hours, with less exposure of personnel, by means of aircraft. Hazards there will always be in pioneering, but these are but an item in the sum total of the price of progress. Every achievement takes its toll, and we, who are the beneficiaries of what has gone before, do well to pay tribute to our contemporaries who have made their contribution to the well-being of posterity.

"In an era teeming with invention and its resulting application to commerce and industry, it is difficult to ascribe to each its true value. The use of aircraft conserves time—the stuff that life is made of—facilitates travel, bringing together in closer relationships and better understand-

ing peoples of all nations; expedites commerce, with resulting prosperity; provides more effective means for exterminating crop- and life-destroying insects, and assists beyond measure man's battle against the destructive forces of fire and flood.

"There is not a man, woman, or child in this Nation to-day who is not more secure in, and better able to enjoy, all that life holds dear by reason of the pioneering that has been done in civil aëronautics. Comparatively few in number are they that realize this, and still fewer fully comprehend its future possibilities. Truth is not always obvious, but faith sustains when vision fails.

"May I recount briefly something of what our Nation has contributed to the development of aviation. It includes the invention and first flight in an airplane, the first transatlantic flight, the only flight around the world, and the first flight to the North Pole.

"During this year alone American pilots, using aircraft and engines designed and built in the United States, completed a series of world-renowned transoceanic flights, spanning time and again the Atlantic and the Pacific from the mainland to the Hawaiian Islands. These expeditions are frequently referred to as 'American stunt aviators,' but their real significance is far greater than that designation implies. They have done much to promote international good will, as well as to stimulate interest in aviation. All the participants in these great undertakings are worthy of our unstinted praise.

### NIGHT FLYING PROVED PRACTICABLE BY POST OFFICE DEPARTMENT

"Our Post Office Department first demonstrated to the world the practicability of night operations of aircraft for commercial purposes when it established regular night service between Chicago, Illinois, and Cheyenne, Wyoming—a distance of about 900 miles. This original service, which has not as yet been equaled elsewhere in the world, in a little over three years' time has increased nearly fivefold. The operation, wholly in the hands of private enterprise, is now self-supporting, while every European air line is heavily subsidized.

"Our supremacy in air-mail volume, mileage, and profitable enterprise is generally conceded. While our passenger and express traffic on scheduled lines is not comparable to our air-mail record, it is greatly underestimated. Air-mail contractors are now directing their attention to this branch of service, with every indication of equal success.

"Activities in all other branches of civilian aviation in the United States exceed the combined similar activities of the entire world. This includes the number of planes produced and in operation, miles flown, goods and passengers carried on other than regular schedules, photographs taken, areas patrolled, acreage dusted, and money earned. With these achievements, no longer should an inferiority complex impede our aëronautical progress.

"The Army and Navy have participated in and contributed much to the pioneering success of civilian aviation. It is but logical that there should always be the closest coöperation between civil and military aëronautics, for they are indispensable to each other. We may all take pride in these accomplishments and should render our whole-hearted support individually and collectively toward making and keeping America first in the air.

### HOW THE PUBLIC CAN AID CIVIL AVIATION

"The prosperity and political success of our Nation is in no small measure due to its highly developed systems of transportation and communication. That form of transportation which exceeds all others in speed and flexibility is bound to play an important part in this Nation's future. Whatever else may be said about aircraft, certainly it provides the swiftest and most elastic means of transportation that ever has been or probably ever will be developed.

"We are still in the initial stage of its application to the needs of industry and commerce, as well as its service to the general well-being of mankind. Each and all of us may coöperate in one or more capacities, by using the air mail and express, traveling by air, fostering community airport development, keeping informed about aëronautics, and applying our ability toward solving technical and economic problems.

"Those who participate in making aërial operations more general, economic, and reliable will find themselves engaged in a task of national importance and absorbing interest. Let it never truthfully be said of any of us that we failed to give our utmost support to civil aëronautics — truly a harbinger of geographic knowledge, good will, prosperity, and national security."

### MILLIONS HEAR CEREMONIES OVER THE RADIO

In addition to the 6,000 persons in the Auditorium, millions of Americans heard the foregoing addresses and were thrilled by the applause over the radio, the National Broadcasting Company having arranged to broadcast the proceedings over a chain of fifteen stations, including WRC, Washington; WBZA, Boston; WBAL, Baltimore; KSD, St. Louis; WMC, Memphis; WJZ, New York; WHAM, Rochester; KDKA, Pittsburgh; WHAS, Louisville; WSB, Atlanta; WBA, Springfield; WJR, Detroit; KYW, Chicago; WSM, Nashville, and WBT, Charlotte.

At the conclusion of the addresses, the speakers, flyers, and other participants in the ceremonies left the platform and took seats in the Auditorium, where for an hour they saw, in motion pictures,* a historical pageant of the outstanding achievements in aviation since those early days, nearly two decades ago, when the Wright Brothers gave their first demonstration flights for the United States Government.

Motion-picture archives throughout the world were requisitioned in order to show the early flights of Dr. Orville Wright, the first flight made by a woman (Miss Harriet Quimby, of Massachusetts) across the English Channel, Commander

*"Heroes of the Air," a film record especially assembled for the National Geographic Society through the courtesy of Paramount Famous Lasky Corporation.

International Newsreel

PRESIDENT COOLIDGE PRESENTS THE HUBBARD MEDAL TO COLONEL LINDBERGH

The presentation of the National Geographic Society's highest award was made in the presence of 6,000 members assembled in the Washington Auditorium. The medal bears the following inscription: "Awarded by the National Geographic Society to Charles A. Lindbergh for his heroic service to the science of aviation by his solitary flight from New York to Paris, May 20-21, 1927." (See "Air Conquest," in the NATIONAL GEOGRAPHIC MAGAZINE for August, 1927.)

Albert C. Read, U. S. N., and his *NC-4* upon the completion of the first transatlantic flight in 1919; the reception accorded the intrepid British flyers, Alcock and Brown, upon the completion of the first nonstop flight across the Atlantic; the greeting given the U. S. Army Around-the-World Flyers by President Coolidge at Bolling Field; also the President's reception of the Army's Pan American Good Will Flyers;* the reception accorded Commander Richard E. Byrd, conqueror of the North Pole by air, and his associates upon their arrival in France after one of the most dramatic transoceanic flights of history;† the take-off of the Detroit-to-Tokyo flyers; the picturesque floral reception accorded the San Francisco-to-Hawaii flyers in Honolulu; the milling throngs which in their enthusiasm almost mobbed Miss Ruth Elder and her pilot, Mr. Haldeman, upon their arrival in Paris, and, finally the thrilling story in pictures of Colonel Lindbergh's flight in the *Spirit of St. Louis* and his reception both abroad and at home.

### NOTED AUDIENCE AT HISTORIC CEREMONY

Among the members of The Society and their invited guests present in the flag-decked Washington Auditorium for the presentation were: The Chief Justice of the United States and Mrs. William Howard Taft, Mr. Justice and Mrs. Edward Terry Sanford, Mr. Justice and Mrs. Harlan F. Stone, Mr. Justice and Mrs. Pierce Butler, and Mr. Justice James Clark McReynolds, of the U. S. Supreme Court.

The Secretary of State and Mrs. Kellogg; the Secretary of War and Mrs. Davis; the Attorney General and Mrs. Sargent; the Postmaster General and Mrs. New; the Secretary of the Navy and Mrs. Wilbur; the Secretary of the Interior, Mr. Work; the Secretary of Agriculture and Mrs. Jardine; the Secretary of Labor and Mrs. Davis.

The Speaker of the House of Representatives and Mrs. Nicholas Longworth; Senator and Mrs. Bayard; Senator and Mrs. Broussard; Senator and Mrs. Cameron; Senator and Mrs. Copeland; Senator Curtis; Senator and Mrs. Dale; Senator du Pont; Senator and Mrs. Edge; Senator and Mrs. Fletcher; Senator and Mrs. Gillett; Senator and Mrs. Glass; Senator Hale; Senator and Mrs. Howell; Senator and Mrs. Andrieus A. Jones; Senator and Mrs. Norbeck; Senator and Mrs. Overman; Senator and Mrs. Phipps; Senator and Mrs. Shortridge; Senator and Mrs. Simmons; Senator and Mrs. Ashurst; Senator and Mrs. Caraway; Senator and Mrs. Harris; Senator and Mrs. Kendrick; Senator and Mrs. David A. Reed; Senator and Mrs. Sackett; Senator Steiner; Senator and Mrs. Tyson.

Hon. John Q. Tilson, Majority Floor Leader of the House of Representatives, and Mrs. Tilson; Hon. Fred A. Britten, of the Naval Affairs Committee, and Mrs. Britten; Hon. Bertrand H. Snell, Chairman of the Rules Committee, and Mrs. Snell; Hon. Frederick N. Zihlman, Chairman of the District of Columbia Committee, and Mrs. Zihlman; Hon. Allen T. Treadway, of the Ways and Means Committee, and Mrs. Treadway; Hon. Theodore E. Burton, Representative Mary T. Norton, and others.

The Ambassador of Great Britain and Lady Isabella Howard; the Ambassador of Japan and Madame Matsudaira; the Ambassador of Peru, Dr. Hernán Velarde; the Ambassador of Spain and Señora Padilla; and the Ministers of Austria, Bulgaria, China, Colombia, Costa Rica, Denmark, the Dominican Republic, Egypt, Finland, Honduras, Ireland, Nicaragua, Panama, Persia, Poland, Rumania, Salvador, Serbs, Croats and Slovenes, Siam, Uruguay, and Venezuela.

The Board of Trustees of the National Geographic Society; Hon. Theodore Douglas Robinson, Assistant Secretary of Navy; Hon. Edward P. Warner, Assistant Secretary of Navy for Aëronautics; Hon. F. Trubee Davison, Assistant Secretary of War for Aëronautics.

Representatives of the learned professions, and correspondents for the foremost periodicals and daily newspapers of America and of the foreign press.

* See "How Latin America Looks from the Air," by Maj. Herbert A. Dargue, in the NATIONAL GEOGRAPHIC MAGAZINE for October, 1927.

† See "The First Flight to the North Pole," and "Our Transatlantic Flight," by Commander Richard E. Byrd, in the NATIONAL GEOGRAPHIC MAGAZINE for September, 1926, and September, 1927, respectively.

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# AROUND THE WORLD IN THE "ISLANDER"

## A Narrative of the Adventures of a Solitary Voyager on His Four-Year Cruise in a Thirty-Four-Foot Sailing Craft

BY CAPT. HARRY PIDGEON

*With Illustrations from Photographs by the Author*

"WHY did you do it?" is the question I am most frequently asked in regard to my single-handed voyage around the world.

The best reason I had was the lack of means with which to build a larger vessel and hire a crew to sail it for me. There is also a great satisfaction in accomplishing something by one's own effort.

My love of the sea did not come from early association, for I was born on a farm in Iowa and did not see salt water until I went to California, when I was eighteen years of age. So far as I know, none of my ancestors ever followed the sea.

After several years spent on a ranch in California, I went to Alaska, where I learned to saw out boards from the trees on the shore and make small boats, in which I had many thrilling adventures on the rivers and lakes of the north.

At one time I owned a small vessel and sailed it among the islands of southeastern Alaska, but I never went out upon blue water and most of my time was spent hunting and making photographs along the rivers and in the mountains of that great land.

Returning to California, I became a photographer among the great trees of the Sierras, but after a few years of this work, pleasant though it was, I longed for new scenes.

### A VOYAGE TO ISLES OF THE SEA IS DECIDED UPON

About this time I came across the plan of a boat that seemed to be very seaworthy and, in addition, was not too large for one man to handle. Moreover, the construction of it did not seem to be too difficult for my limited knowledge of shipbuilding. I decided to build my long-dreamed-of ship and go on a voyage to the isles of the sea.

From the mountains I went down to the shore of Los Angeles harbor, set up my camp, and began the actual work of construction.

The plan from which I was to model my ship was one that had been drawn for Capt. Thomas Fleming Day, who had had wide experience in sailing small boats, and it was Captain Day's idea of what a small seagoing craft should be. It was of the *Sea Bird,* or V-bottom, type, with iron ballast on the keel.

The timbers for the frame were all very heavy and reinforced at the bilge with steel knees, and when they were all bolted together as strongly as possible, the plank-

THE "ISLANDER" TAKES FORM

The vessel in which the author made his around-the-world cruise was almost entirely the product of his own hands.

ing was laid on. As I was working alone, the most difficult part of the construction was to put on the thick, heavy planks. It was a long, hard job, but gradually something like a boat began to appear.

The cabin was twelve feet long, arranged with a berth on either side and spaces for drawers and a wood-burning stove. Aft of the cabin was a cockpit, built water-tight and self-bailing.

### THE CRAFT IS CHRISTENED "ISLANDER"

The masts were made and stepped, and the name *Islander,* which I had given the new ship, I painted on the stern board. I dug the ground away underneath and laid down ways on which the vessel might slide into the water. From the laying down of the keel to the launching, the work came near to being entirely of my own hands.

The *Islander* was rigged as a yawl, and was 34 feet long over all, 10 feet 9 inches beam, and drew 5 feet of water with no load in her.

For many reasons, mostly financial, I have never installed a motor. I built a skiff nine feet long for a tender, and when at sea this was hauled on board, turned over against the cabin, and lashed fast. In this position it was carried wherever I sailed.

The *Islander* cost me about $1,000 for material and a year and a half of hard work

### HOW THE SHIP WAS NAVIGATED

Many pleasant days were spent sailing about the near-by islands, sometimes with friends, but more often alone. In the meantime I procured books and instruments and began to learn something of navigation.

My method of navigation was simple, and consisted of determining the latitude and longitude by observation of the sun—two simple problems that require no special ability to master.

For the purposes of navigation, the earth is laid out in imaginary lines, called meridians of longitude and parallels of latitude, which may be likened to the streets and avenues of a city. The position of a ship at sea, and out of sight of land, on these meridians and parallels can be solved only by astronomical observation. When one can solve these problems he can find his way about on the sea as readily as he finds the numbers along the

THE AUTHOR LAUNCHING HIS YAWL IN LOS ANGELES HARBOR

Captain Pidgeon was a year and a half building his boat. Exclusive of his labor, it represented an expenditure of $1,000 for materials.

avenues and streets of a well-laid-out city. Dead reckoning I kept only mentally, and that merely to keep track of my position between observations of the sun.

The textbook on navigation that I used was "Navigation," by Harold Jacoby. I also had "The American Practical Navigator," published by the United States Hydrographic Office. For navigating instruments I had two compasses, two sextants, protractor, parallel ruler, dividers, and a taffrail log.

While the theory of navigation is simple and easy to learn, seamanship—the ability to care for and handle a vessel under all conditions and stresses of weather—is acquired only by experience and long practice.

When I felt myself competent, I set about preparations for an overseas voyage.

### GROUND HIS OWN GRAIN FOR FLOUR AND MEAL

My boat had ample space for supplies, and of staples that keep, such as beans, peas, brown rice, dried fruits, sugar, bacon, and salad oil, I laid in a sufficient quantity to last several months. For bread I carried wheat and corn, which I ground in a small hand mill as needed. Of canned goods I had salmon, sardines, milk, tomatoes, peaches, and figs; but of these I ate sparingly.

I took along only what potatoes, onions, and fresh vegetables could be used before spoiling, and renewed the supply at every opportunity. I always used whatever native fruits and vegetables could be obtained at the places that I visited. Of water I had carrying capacity for about 100 gallons. I can get along very well on a half gallon per day. At sea I used salt water for bathing purposes.

### THE "ISLANDER" SAILED ITSELF AT NIGHT

When one goes to sea in a small boat, many things have to be left behind. If not prepared to make some sacrifices, voyagers had better make their cruises in large, swift vessels carrying refrigerators or stay at home.

My first ocean voyage in the *Islander* was to the Hawaiian Islands and I went single-handed.

I am continually being asked, "What did you do at night?" That was what I now

ROUTE FOLLOWED IN THE CIRCUMNAVIGATION OF THE GLOBE

In his 34-foot yawl-rigged craft, Capt. Harry Pidgeon made his solitary way from California, through the South Seas, across the Indian Ocean, around the Cape of Good Hope, over the Atlantic, through the Panama Canal, back to his starting point.

began to learn for myself, and I lost a lot of sleep while doing it.

In the end I learned to shorten sail and get it balanced, so that the *Islander* would sail on almost any course while I slept. If she did run off the course a bit, what of it?

The return voyage from Hawaii was stormy, with almost continual head winds, but I had a shipmate, Earl Brooks, a friend, who came along looking for adventure.

I learned something of the sea on the voyage to Hawaii and became acquainted with the *Islander;* for ships, like men, have a personality of their own. Confidence had come with experience, and I began making preparations for a voyage to the South Seas.

### OFF FOR THE SOUTH SEAS

Charts and sailing directions were procured for the Marquesas, Society, and Samoa Islands, which places I intended to visit before returning to California. At the same time I had it in mind to extend the voyage if circumstances were favorable.

At noon on November 18, 1921, I sailed from Los Angeles for the Marquesas Islands. A fair wind was blowing, and on the third day out I saw the sun rising over Guadalupe Island, standing high on the eastern horizon. I had fair winds down to the doldrums, in latitude 11° N. I had never been so far south before, but I recognized the place when I ran out of a terrific rain squall into a calm.

For two weeks I was tossed about on a fitful sea. Sometimes the sun came out, but more often it rained, and there was a squall somewhere in sight most of the time. There was one day when I made only one minute of latitude in 24 hours, but the wind did blow once in a while, else I should have been in the doldrums yet. I met the southeast trade wind in latitude 5° N. and crossed the Equator for the first time at longitude 129° W.

Ten days in a gentle east-by-south wind, and then one morning I awoke to see Ua Huka Island of the Marquesas Group right ahead. I stood away to where Nuku Hiva lay dimly outlined in the west, and that evening I dropped anchor in Taiohae

Drawn by A. H. Bumstead

A VOYAGE OF NEARLY 27,000 MILES, SAILING WESTWARD FROM LOS ANGELES

Without funds for a de luxe trip around the world, the resourceful author decided to see foreign climes and strange peoples with the means at his command. He experienced a voyage of high adventure, with cordial hospitality extended wherever he cast anchor.

Bay, after 42 days at sea, during which time there was never sight of a sail or of the smoke of a passing steamer.

The French commissioner came off and after he learned that I came from California, welcomed me with, "Come on shore and have dinner with me. I lived in San Francisco for four years."

The *Islander* never sailed into a fairer haven than the Bay of Taiohae. After one passes through the entrance, about half a mile wide, a beautiful basin, about a mile and a half in diameter, opens out. From the fringe of coconut trees on the shore, the land slopes upward in many a glen and valley to the cliff and crags of the mountain range that surrounds the bay on all sides except at the entrance on the south (see page 146).

### THE SCENE OF MELVILLE'S "TYPEE"

No island of the sea has attracted me as this one has—not alone for the grandeur of its scenery, but for its romantic history as well. During the War of 1812 Capt. David Porter, of the U. S. frigate *Essex*, took possession of Nuku Hiva and used Taiohae Bay as his base. And here Melville deserted the whaler to wander with Toby into the Vale of Typee.

Coming after so long a voyage alone on my little ship to this island of my dreams, it seemed the most romantic place in the world.

When discovered, the Marquesas Islands were densely populated, but with the coming of the white man epidemic after epidemic swept the inhabitants off, until at the time of my visit less than two thousand people remained.*

Scattered here and there in the shade of the coconut and breadfruit trees were the houses of less than one hundred people that lived on the shore of this magnificent bay, and few of these were pure Marquesans.

Amid beautiful scenery and a healthy climate, they lived surrounded by their pigs, chickens, and dogs, and with man-

* See, also, "A Vanishing People of the South Seas," by John W. Church, in the NATIONAL GEOGRAPHIC MAGAZINE for October, 1919.

NO FAIRER HAVEN THAN TAIOHAE BAY: MARQUESAS ISLANDS

Forty-two days out from Los Angeles, the author sailed into these quiet waters of Nuku Hiva Island. On the beach to the right Capt. David Porter, American naval officer of the War of 1812, had his encampment and repaired his ships. Behind the clump of trees, just where the reef of rocks extends from the shore on the left, once stood the house of a Marquesan king (see illustration, page 157). Near by, under the tamarind tree, can be seen the roof of Queen Vikahue's house.

THE AUTHOR VISITS A MARQUESAN HOME

The sides of the dwelling are made of breadfruit saplings and split bamboo; the roof is a thatch of coconut-palm fronds. The house is simply furnished with two or three mats, and stands upon a stone platform known as the paepae, built without mortar or cement (see, also, text, page 151).

A SOUTH SEAS DRY DOCK WHERE NECESSITY DEMANDS

In order to paint the bottom of his craft before proceeding through the countless islands of the South Pacific, the author beached his craft on the sands of Anaho Bay, on the north side of Nuku Hiva, of the Marquesas Group (see text, page 153). During his round-the-world cruise the author repeatedly beached his vessel in this manner to scrape and paint her (see pages 175 and 201). Here Robert Louis Stevenson first saw the South Seas when he came to this haven in the *Casco*.

A STONE CARVING: TYPEE

There are 24 figures like this in the foundations of three houses on Nuku Hiva Island, where priests once lived.

ONE OF THE TWO LAST SURVIVING TYPEES

Poi Utu lives in the Vale of Typee, made famous by Herman Melville's South Sea Island romance of the same name (see text, page 151).

THE AUTHOR EXAMINES A STONE WALL IN THE VALE OF TYPEE

WHERE MARQUESAN SAVAGES FORMERLY KEPT THE SKULLS OF THEIR ENEMIES

A warrior priest lived on the paepae (stone platform) to guard the skulls, one of which the author holds in his hands. When one of these priests died, his body was put away in the banyan tree, so that even in death he still kept guard (see text, page 153). A tabu has been placed on the spot and no native will go near it.

POI UTU AND THE AUTHOR STANDING BY "PORTER'S PAEPAE"

This wall was the scene of fighting between the Typees and the forces of Capt. David Porter, of the U. S. frigate *Essex,* in the War of 1812.

goes, papayas, and bananas in profusion all around. Never have I seen a place where tropical produce flourished more luxuriantly or grew with less care.

About five miles west of Taiohae Bay is a small landlocked harbor called Hakatea. Extending inland from the bay is the wonderful Hakaui Valley, the west side of which is formed by almost perpendicular cliffs of fantastically eroded volcanic rock. Off the cliff plunges a waterfall for more than 2,000 feet down into a dark gorge, whence the waters find their way through tropical verdure to the sea.

High up in one of the gorges, near the falls, perched like an eagle's nest, I came across an old native fort called Ana-o-tako, where once the people of Hakaui Valley had defended themselves when attacked by all the other tribes of Nuku Hiva and Ua Pou.

The largest and fairest valley of Nuku Hiva is the Vale of Typee, or Taipi Vai, as the natives call it. Melville has made the valley famous in his "Typee," and Captain Porter in his Journal has given a stirring account of the valor of its inhabitants. Sailing into Comptroller Bay, I anchored off the beach at Taipi Vai and made the acquaintance of Hakatau and Poi Utu, the two last surviving Typees.

### WHERE MELVILLE'S HERO FEASTED WITH KING MEHEVI

Poi could speak a little English and, becoming my guide, told me what he could of the native history and tradition. He pointed out the site of the forts where his forefathers had fought with Captain Porter's force, and other places of interest.

Far up in the valley was the site of an ancient feasting ground, where he said long ago two Americans had lived with a great chief. His description was such that it seemed probable that it was the place where Melville's hero feasted with King Mehevi.

As we wandered among the deserted paepaes (stone platforms upon which the natives build their houses), Poi would occasionally point to one side and say, "Tabu paepae; Kanaka no go there!" and would pass by another way. He was referring to spots which, because of some events that had taken place there, were held to

MARQUESANS MAKING "POIPOI" FROM BREADFRUIT

This famous dish (not to be confused with the *poi* of Hawaii, Tahiti, and other South Sea Islands) is made from rotted breadfruit. After the white, somewhat mushy pulp is ground in a wooden bowl, it rises like a mass of fermenting dough. An unpleasant odor and an acrid, bitter flavor make it decidedly distasteful to the uninitiated palate.

MARQUESANS ENJOYING THEIR NATIONAL FOOD

All sit on mats and dip into the same bowl with their fingers. The droughts from which the Marquesan has suffered, necessitating the long storing of breadfruit, were responsible for a practice which eventually established rotted breadfruit as his national dish, and centuries of eating the fermented pulp finally destroyed his liking for the fresh fruit (see page 155).

EIGHT TIMES A YEAR TO NUKU HIVA COMES THE WORLD'S POSTMAN

A group of Marquesans at Taiohae Bay bids farewell to the *Hinano* as it sails for Tahiti.

be forever sacred from the intrusion of man—spots which were tabu.

One day I came across one of these tabu places. At the foot of an ancient banyan tree was a paepae about 15 feet square and 4 feet high. In it was a pit about 3 feet across. How deep the pit was I could not see, for it was full of skulls (see page 150).

When I described the place to Poi, he said, "Tabu paepae," but I learned the history of the place. It was called Ahau. Here the Typees had kept the skulls of such of their enemies as had been unfortunate enough to fall into their hands.

On this paepae a warrior priest had lived and kept guard over the skulls. When one of these priests died his body was placed in the trunk of the banyan tree in such a manner that the ever-growing roots thrown down from above would grow over and incase it. Thus, even in death the priests still kept guard.

When I was leaving Typee, Poi gave me the largest bunch of bananas that I ever saw; but he would not let me help carry it down to the shore, for that was not the way of Typee. I must not be seen carrying it. He hung the bunch on a pole and took up the short end, while his adopted daughter shouldered the other.

### THE "ISLANDER" GOES INTO IMPROVISED DRY DOCK

From Comptroller Bay I sailed around to Anaho Bay, on the north side of Nuku Hiva, where there is a quiet nook, a good place for beaching and repairing boats. With the spring tide I ran the *Islander* on the beach and went to work with scraper and paintbrush (see illustration, page 148).

For two days and nights I worked with scarce time to rest, watching my boat with each turn of the tide, and when one side was finished I warped her around and down on the other side. It was most exhausting work, but it had to be done. When in tropical waters no other part of an unsheathed vessel requires such constant care as the bottom.

One of the peculiarities of Nuku Hiva and, so far as I know, of the other islands of the Marquesas Group, is the absence of coral reefs. The deeply indented shore and the small area of the lowlands at the mouth of the streams indicate that the

THE AUTHOR'S YAWL, A TINY SPECK OF WHITE IN THE MIDDLE FOREGROUND, LIES AT ANCHOR IN COMPTROLLER BAY

The largest and fairest valley of Nuku Hiva is the Vale of Typee, or Taipi Vai, which runs down to this harbor (see text, page 151).

THE BREADFRUIT TREE (LEFT) PROVIDES THIS FAMILY'S FOOD

The most important staple of the South Sea Islands is a fruit about the size of a small melon. Wallace, the noted naturalist, says that "with meat and gravy it is a vegetable superior to anything I know, either in temperate or tropical countries." When cooked, the taste has been compared to that of boiled potatoes and sweet milk. The author made only a brief visit to Ua Pou (Island of Night) of the Marquesas Group.

A BANANA-SHADED ROAD IN HAKAUI VALLEY

INTERVIEWING REPOY, THE LAST OF THE HAPPARS

In his "Typee" Melville gives a vivid description of how the defeated Happar tribesmen were borne to a sacred spot, where their bodies provided the baked meats for a triumphal feast. In the author's hand is the string with which he operated the shutter of his camera to make this picture.

ON THIS PLATFORM ONCE STOOD THE HOUSE OF A MARQUESAN KING

island subsided too rapidly for the reefs to build up. A botanist who was exploring the islands during my stay told me he had found plants that in this latitude belong at an altitude of 10,000 feet, although the highest peaks of the Marquesas are now only about 4,000 feet above sea level.

### A SHARK PURSUES THE SKIPPER

I sailed from Nuku Hiva carrying the blessings of its kind people and my ship was laden with its fruit. The wind was light, but at dusk Ua Pou, the Island of Night, lay abeam. The wind continued light and I was reminded of the doldrums.

One day, when becalmed, I plunged over the side and swam around the boat; then, seized with a sudden apprehension, I climbed quickly on board in time to see a shark come swimming up. He followed the boat all day, and only left off after I had wounded him twice with the boat hook.

I had no charts of the Tuamotus, but the sailing directions gave the latitude and longitude of the islands.* One morning a feathery line appeared on the horizon. It was Takaroa and my first sight of a coral atoll.

Coasting along off the shore, I passed a great four-masted ship, the *County of Roxburgh,* high on the jagged reef.

When I came up off the pass into the lagoon the tide was running in. Takaroa Village is just inside the entrance, and in a few minutes I was alongside the wharf (see page 159) with a crowd of cheerful natives devouring the bananas I had brought from Nuku Hiva.

### THE MARVELS OF AN ATOLL

One's first visit to a coral atoll makes a vivid impression—just a wreath of verdure cast upon the sea. A thin fringe of coconut trees and bushes incloses the calm waters of the lagoon, but down below all this is a wonderful underwater world, where myriad fishes of all colors and shapes, from monsters to butterflies, dart or glide in and out of the coral caves. On the inner reef are many beautiful shellfish.

I never tired of searching the beach for the pretty shells that washed ashore.

But the hurricanes wash the soil off the island, and little else besides coconuts will grow in the coral gravel. The natives

* See, also, "The Romance of Science in Polynesia," by Robert Cushman Murphy, in the National Geographic Magazine for October, 1925.

THESE GIRLS OF TAKAROA GREATLY RELISHED THE BANANAS BROUGHT BY THE AUTHOR FROM THE MARQUESAS

present a prosperous appearance, for they produce much dried coconut for export, and pearl shells are found in the lagoon. All able-bodied Tuamotuans are pearl divers and most of them are good sailors as well.

A change in the weather had set in while I was at Takaroa, and the wind was blowing strong, with frequent rain squalls, when I sailed for Tahiti.

From island to island I picked my way, and the next day, in a squall, I rounded Kaukura and lay on a course for Tahiti, clear of the Tuamotus, on whose reefs the timbers of many a stout vessel have bleached.

### A HEARTY WELCOME TO TAHITI

No isle of the Southern Seas has a more gorgeous appearance than Tahiti. When the sun rose over the scene of island splendor, I was gliding along outside the barrier reef looking for the entrance to Papeete harbor. My coming had been heralded by the crews of the trading schooners plying to the Marquesas, and a crowd, including several Americans and other English-speaking residents, gathered to welcome me to the isle.

When approaching from the sea, one does not see much of Papeete, for it is hidden away under immense shade trees, which make it quiet and restful.

There are many places of interest to see in Tahiti, if one has the energy to find them, but on the whole it is easier to go to the morning market or sit in the shade and hear tales of strange adventure told by men from the ends of the earth. On the esplanade near where the *Islander* lay were some magnificent trees, in the shade of which gathered the men of leisure to discuss the questions of the day. Here and at the Sunday morning market one could meet all the worth-knowing characters of Papeete.

### SUNDAY MARKET TAKES THE PLACE OF A NEWSPAPER

There was no newspaper published in Papeete, but the Sunday morning market answered every purpose. The men talked, the girls bought garlands of flowers to deck themselves with, and the housewives

laid in a supply of fruit, fish, and vegetables.

In the Society Islands I noticed a peculiarity in the tides that I have not seen elsewhere, nor have I found any explanation. High tide always occurs at about midday and again at midnight.

I had intended staying a month in Tahiti, but it was two months, and I had helped the French celebrate the anniversary of the fall of the Bastille before I broke away from its fascination.

When I sailed from Papeete the American consul charged me $5 for a bill of health. This was the only place the world around that the *Islander* was not exempted from paying port charges. From Papeete I crossed over the channel to Moorea Island and dropped anchor in beautiful Paopao Bay (see page 164).

DOCKED AT TAKAROA: TUAMOTU GROUP

On the shore of the bay lived a Raiatean, who had come there to look for buried treasure. He sought me out and invited me to come to his house to eat and to talk. He had a map of the bay that was supposed to indicate the location where a fabulous sum of South American gold was buried. It was romantic to find a South Sea islander digging for treasure, but I think he was getting discouraged about finding the gold, for he had rented a piece of ground and made a good start for a plantation.

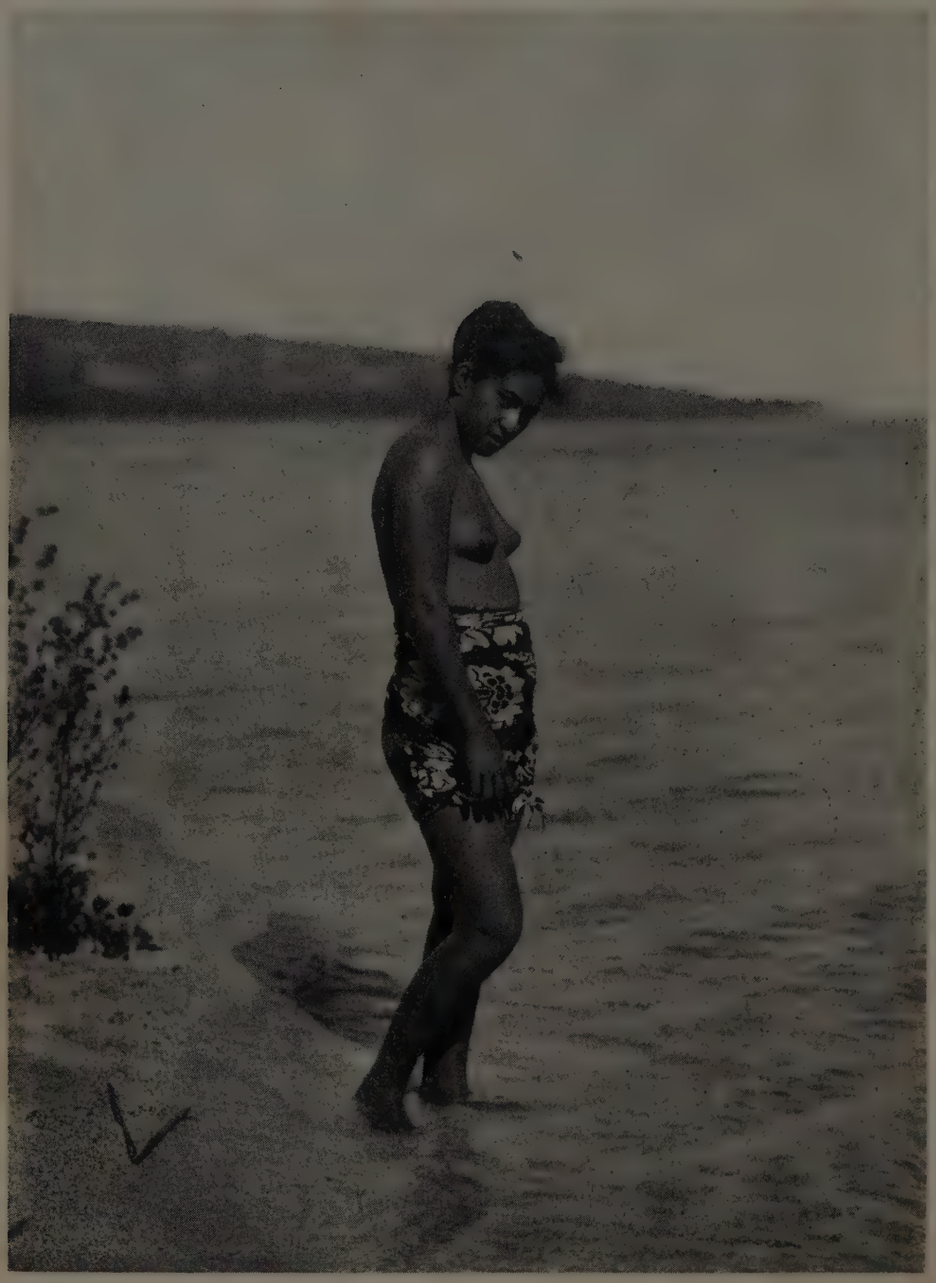
With a native boy for a guide, I walked across country to Papetoai Bay. There was no road, but we followed for a time a track made by wild pigs through the forest, and then wandered, hot and thirsty, through the wild canes. At last we came down to where a herd of cattle was grazing on a beautiful green meadow.

We found sweet oranges to quench our thirst and rested in the shade of the trees. It was one of the prettiest spots in the world, and I thought I should like to settle there and quit the tossing sea, but in the end I wandered back to the *Islander* and made ready to sail.

### INTRODUCED TO ALL THE INHABITANTS OF BORABORA

With a light, fair wind I sailed on and came to Borabora, in the Leeward Group of the Society Islands.

Borabora slopes down from a high central peak, and the surrounding barrier reef has a fringe of coconut trees, giving the whole the appearance of a volcanic



ON THE SANDS OF TAHITI, THE DEAUVILLE OF THE SOUTH SEAS

island standing in the lagoon of an atoll. It is one of the most charming isles of the South Seas (see page 165).

Its only white inhabitant was the French gendarme, who did not speak English.

I started out for a walk and asked a young man, Tauraa Ottori, some questions about the island road. He did not seem to understand, but he took it on himself to accompany me, or rather he exhibited me to the inhabitants of the outlying districts. We called at almost every house that we passed, and to every one that we met on the road he seemed to be giving a glowing account of his charge.

I must have met most of the inhabitants of Borabora that day; but it was a wonderful jaunt, and the road passed right around the central mountain of the island.

The people were busy gathering and drying their coconuts. Some were preparing tapioca from manioc roots; others were looking after their vanilla, a considerable quantity of which is produced on the island. One is continually hearing about how lazy the Kanakas are, but I have wondered why they are so industrious as they are.

A few days at Borabora and then one morning I put to sea again. When the sun was low the peak of Borabora was only a small blue dot on the eastern horizon, and for eleven days I sailed on into the west.

### RUNNING BEFORE A STORM INTO PAGO PAGO

For the most part the weather was fine, with the trade wind well around to east, but on the last day the wind and sea came rolling up from the south, driven by some commotion in the southern ocean.

All day I sat at the tiller, running off before the worst of the breaking seas and hoping to close up with the coast before darkness set in, for I did not know if I should dare to try running into a strange harbor on a stormy night with the wind blowing right on shore.

It was 2:30 in the afternoon when I sighted Tutuila Island, and it looked small and far away. The sun had set before I came up with the east end of the island, but before the light failed I made out the headlands on either side of Pago Pago harbor. In the gathering gloom of night and driving before a rain squall, I sailed in, let the anchor go, and no one on shore knew I was there until the next day.

When morning came I looked out on a landscape greener than any I had seen in the eastern islands. American Samoa has an abundance of rain; hence the fresh, green appearance of the place. I once asked an old resident if it rained every day in Samoa, and he replied that he had lived there 20 years and had no recollection of a day when it did not rain some time during the 24 hours. However, the rain comes in heavy showers, more often at night, with much sunshine during the day.

NATURE'S LARDER IN TAHITI

American Samoa is the only place that I visited in the South Seas where the native population is increasing. The people have come less in contact with Europeans, and their houses, clothing, and habits of life have changed less than in most of the islands.

There is no opportunity there for the acquiring of land for plantations and the subsequent importation of diseased Asiatics for laborers.

### TATTOOED PANTS ESSENTIAL TO SOCIETY MAN OF SAMOA

The natives of Tutuila Island still retain enough of their primitive arts and customs to be interesting. The principal social event during my stay at Pago Pago was a wedding feast, which was carried out with much ceremony and with the best dancing I have ever seen.

The ceremonies seemed to be for the purpose of fixing the social standing of those concerned—a thing of which the Samoans are very jealous. In Tutuila Island a man cuts no figure in society unless he has his pants tattooed on.

The Samoans have one of the strangest of strange foods, and they get that but once a year. The season came around while I was there, and I went out with a party of Samoans after palolos. The palolo is a worm that lives down in the coral reefs, and comes to the surface once a year, at a certain phase of the moon, the beginning of the last quarter in October.

It was the night of the twelfth of October when we took a boat and rowed down to the reef near the village of Utulei. At this particular reef the palolos would appear just as the moon rose over Mount Peoa, the Rainmaker.

As the rising moon lit up the sea, the surface of the water was covered with wriggling, threadlike worms that gave out

PEARL DIVERS OF TAKAROA ISLAND AT THEIR BARBER SHOP ON SUNDAY MORNING

Nearly all able-bodied Tuamotuans are pearl divers and also good sailors.

a pale-green, phosphorescent light. All about, the natives in boats and canoes were scooping them up with improvised hand nets. They ate them raw and wriggling and put them in pails to take home. In about two hours the swarm was over.

The palolo spawns at this season. It breaks in two, and that part containing the eggs rises to the surface from the coral reef where it has developed.

### BOUND FOR THE FIJI ISLANDS

While in Samoa I decided to extend my cruise among the islands of the Western Pacific. I was unable to get charts of the Fiji Group at Pago Pago, and had to content myself with a small map, three by four inches in size, from a steamship folder.

I sailed from Pago Pago on October 23, 1922, and laid a course for the Fiji Islands. Along in the evening, while Tutuila Island was still in sight, a squall came sweeping down. While I was reefing the mizzen, the mainsail gybed over, breaking the boom. The worst of the blow was soon over; then I set the *Islander* on the course under jib and mizzen and went below to sleep and rest.

The next morning I went to work and fished the broken boom with some thin boards from the lumber that I had stored in the hold. When I had finished the job, the boom seemed as strong as ever.

Photograph by Dr. Edward Burton MacDowell

WHERE SAILORS OFTEN TAKE FRENCH LEAVE: PAPEETE AT DAWN

Two of Capt. James Cook's crew fell victims to the spell of Tahiti and had to be brought back from the mountains, where each had acquired a tattooed wife to garner his breadfruit and coconuts. Cook himself waxed enthusiastic over the "blooming beauties" of the island, his reference being to botany and not to the native belles. (See "The Columbus of the Pacific," in the NATIONAL GEOGRAPHIC MAGAZINE for January, 1927.)

Wailangilala Island is only a reef with a few coconut trees on it, but there is a lighthouse among the trees and it is at the entrance to the Nanuka Passage, a channel through the reefs of the eastern group of the Fiji Islands. Just before sunset, on the sixth day out, I sighted the Wailangilala light. A course was set to run through the passage, and the *Islander* sailed on during the night. When morning came there were many islands in sight on either hand.

During the day I crossed the 180th meridian and sailed into east longitude (see map, pp. 144-5). Although the day before was Sunday, October 29, I wrote October 31 in my log book and had lost a day.

The Fiji Group comprises about 250 islands of all sizes, varying from mountainous masses with navigable rivers to mere sand cays with a clump of coconut trees. All are surrounded by coral reefs, and far out to sea, when the mountains on the islands grow blue in the distance,

THE "ISLANDER" AT ANCHOR IN PAOPAO BAY, MOOREA

PAPETOAI BAY TEMPTED THE AUTHOR TO ABANDON HIS CRUISE AND SETTLE ON MOOREA

Here wild pigs roam through the forest and the canebrakes, cattle graze peacefully in the green meadows, and sweet oranges to quench the traveler's thirst grow in profusion (see text, page 159).

BORABORA, A GEM OF THE SOUTH SEAS

This small volcanic island of the Society Group thrusts its lofty peak sheer from a quiet lagoon within a coconut-fringed barrier reef. The only white inhabitant of this island is a French gendarme (see text, page 159).

there are still coral reefs to be encountered.

A lighthouse is a cheerful sight when one is sailing in these coral seas; far too often the reefs are marked with a wreck. With the help of the lights at night and by keeping a close watch by day, I found my way among the islands and reefs to Suva, on Viti Levu Island.

As I came up to the southeast end of Viti Levu, night came on with mist and rain. I stood offshore and hove to. With the coming of daylight I picked up the reef and began tracing it to the westward. The mist blew away and I saw the red-roofed houses of Suva among the low green hills along the shore of the bay.

I found the passage through the reef and sailed in; then the wind died out and left me becalmed until the harbor master came with a launch and towed the *Islander* to an anchorage off the water front.

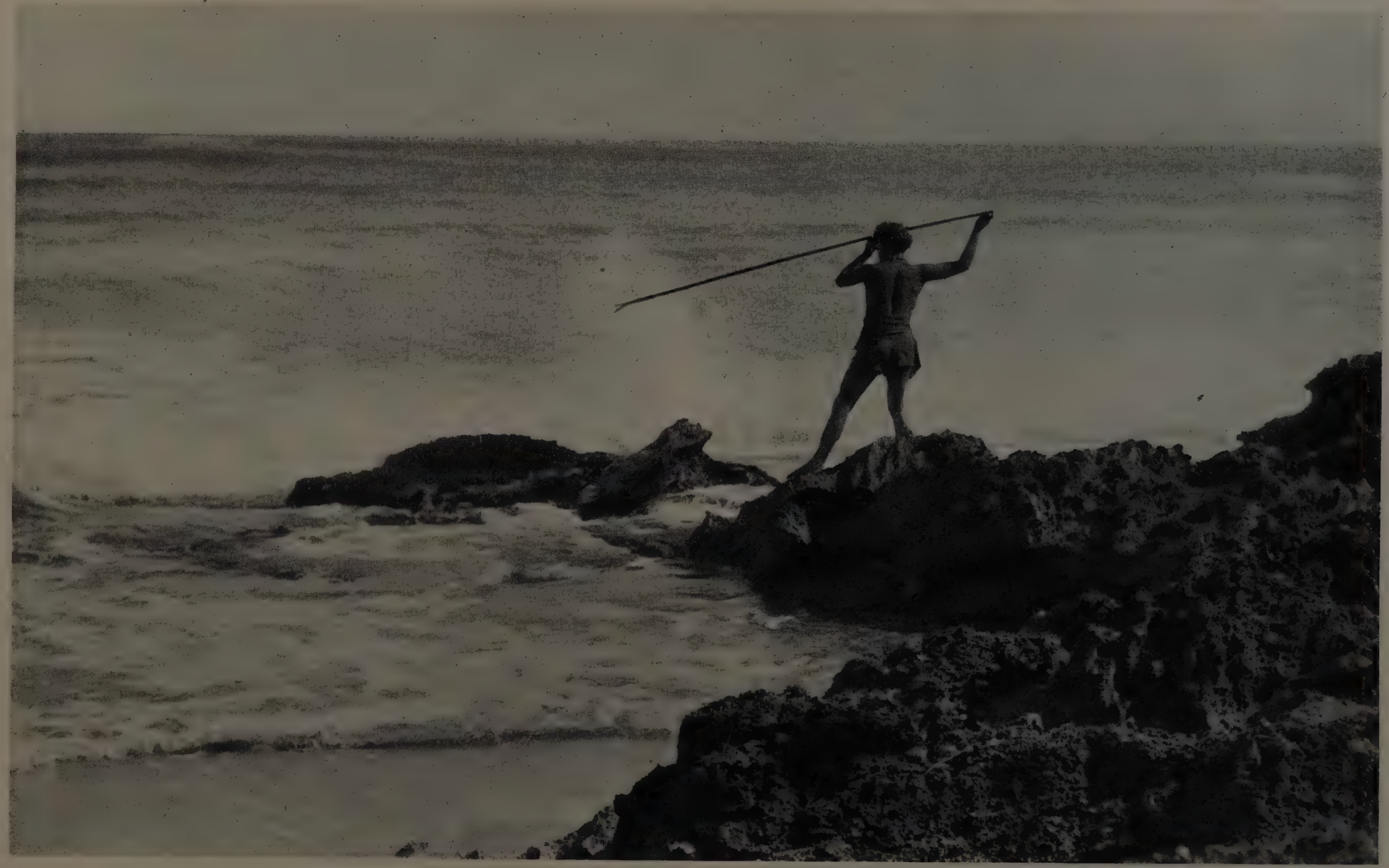
The Fijis have large areas of fertile soil, with many productive plantations. There is beautiful scenery on every hand and the native population retains many interesting customs. The adventurous traveler is well received in any British colony, and Fiji is no exception. I could have contented myself there indefinitely.

### FIJI SAILORS DECORATE THE "ISLANDER"

The Fijian sailors from the trading cutters in Suva harbor came on board to inspect the *Islander* and to ask questions. The Fijians are courageous seamen, but sailing alone they did not comprehend. They said I was a *Matai,* which I understood to mean that I was one of the Ancients. Some of them wore decorations of red and blue streamers, which they took off and tied to the peak of the *Islander's* main gaff.

At the invitation of a hospitable resident, I took my boat up to his home on Navua River. There, while she lay tied up along the bank, in the midst of cane and rice fields, I made a new main boom and repainted her throughout (see page 173).

With the coming of the good weather season in April, I sailed for Vila, in the New Hebrides Islands. The wind was light and it was the morning of the fourth



Photograph by H. Armstrong Roberts

A TRITON OF SAMOA GOES FISHING

Of a light brown color and with handsome features and splendid physique, the Samoan is considered the perfect type of Polynesian. He is born to the sea and is naturally an excellent sailor, fisherman, and boat builder.

THE U. S. NAVAL STATION AT PAGO PAGO, AMERICAN SAMOA

Although missionaries made cricket popular with the Samoans, American sailors cling to their national game, and a baseball diamond (right center) is an integral part of the Naval Station grounds. The harbor at Pago Pago lies within an extinct crater, in shape much like the ankle and foot of a stocking. The Naval Station is on the "instep," its back toward the sea, but with high mountains intervening.

Photograph by H. Armstrong Roberts

THIS SAMOAN CLINGS TO HIS LAVA-LAVA

In the past, a sort of short skirt or kilt was worn by both men and women. Slight concessions in dress are made to-day when the natives are in Pago Pago or elsewhere in the presence of whites, but among themselves and in outlying districts they still wear this simple costume.

A HOME OF WINDOWS AND DOORS

The fiber mats which constitute the walls can be rolled up inside or let down to keep out wind and rain. The floor is usually a circular terrace of stones which are fitted close together and raised two feet from the ground (see, also, page 172).

A SAMOAN ARTIST PAINTING TAPA

The importation of cheap, machine-made cotton goods has caused the natives of Polynesia to abandon the laborious task of making bark cloth (tapa), so that this household art is to-day seldom practiced. In making the tapa the women of the South Seas use the bark of several trees, that of the breadfruit being especially suitable. From a sapling or branch two or three inches in diameter the bark is slit with a sharp stone into lengths of about a foot. These are then beaten until the fibers spread to great width. While in almost a pulpy state, the edges of the pieces are beaten together. The completed cloth is colored in various designs with vegetable dyes.

day out when the last peaks of Fiji disappeared.

On the eighth day out the wind came up strong, raising a rough sea. The sky cleared after sunset and the moon came up bright, making a beautiful sight, as I sat in the companionway contemplating the wonder of it all, the boat keeping the course all the while with no one at the helm. It was far into the night when I went below and slept, while the *Islander* rose and fell with the billows and sailed on into the west.

When I came on deck at daylight I saw land on the starboard bow. It was Efate Island, and far away to the south I could see the peaks of Eromanga. But the wind had fallen to a faint breeze and the sun had set when I rounded Pango Point and entered beautiful Meli Bay, where I drifted about in the quiet water all night With the morning I dropped anchor at Vila alongside of H. M. yacht *Euphrosyne*.

The scene all around was charming, and soon I had made friends—British, French, and natives. A French resident took me for a drive into the country to see his plantation. Coconuts, cocoa, and coffee were the principal crops grown, but all tropical products do well. About all the cultivation anything gets is to have the jungle and weeds cut down and the rats poisoned.

In New Hebrides, for the first time in the South Seas, I came across people suffering from malarial fever, and few of the inhabitants escape it.

### LIVING ON ONE ISLAND, FARMING ON ANOTHER

Wishing to see some of the more primitive natives of the New Hebrides, a two days' sail brought me to Atchin Island,

HER ALLEGIANCE IS TO THE STARS AND STRIPES

Lithe, graceful, well formed in youth, this young woman of American Samoa may lose her beautiful figure with age, but not her cheerful, kindly disposition.

near the north end of Malekula Island.

As I came up off the shore at Atchin, a wild-looking crew dressed only in bark belts boarded the *Islander*. Their appearance was startling and they swarmed on board, grinning. Well, I grinned, too; but they were friendly and assisted me to anchor and furl the sails.

I could carry on a limited conversation with some of them. I asked one old man where he learned to talk English, and he said he had worked on a sugar plantation at Brisbane, Australia, for ten years.

The people lived and kept their pigs on Atchin, but their gardens were located on the mainland of Malekula. Each morning the women folk crossed over to work in the fields and came back at night laden with the yams that were their principal food.

A mission had been located on the island, but the people of Atchin clung stubbornly to their old traditions. They called their place of worship a *hamil*. In a clearing in the forest were set up the big wooden idols, flanked on either side with stone posts. Day and night during my stay at the island the people were holding strange ceremonies on the hamil ground (see pages 178 and 179).

At night, when lit up with the torches of the performers, the hamil was a weird, uncanny place. At such times some of the old devotees said they could see the ghosts of the dead perched on the branches of the trees round about.

On the idols were hung the jaws of the pigs sacrificed on the hamil. For sacrificial purposes the pig was more valuable if it had long tusks. For this reason the people of Atchin broke out the upper tusks of some of their pigs, when the lower tusk, being unopposed, would grow out in a curve. I saw tusks at Atchin

that had grown into two complete circles.

The New Hebrides natives grew the best yams that I have seen. Some that I procured from the Atchin people showed no signs of decay when eaten five months later.

### THE "ISLANDER" SIGHTS LAND BEYOND THE PACIFIC

From Atchin Island I sailed for Port Moresby, New Guinea, running before a light east wind. As soon as I was clear of Malekula Island, a heavy swell set in from the south and a gale blew up from the east, starting cross-seas that made it uncomfortable on board.

Cooking utensils and gear broke loose and went sliding about. The large water cask shifted from its fastenings, but fire-wood and other articles jammed around it kept it from doing damage. For several days I ran under close-reefed sails; then the wind and sea went down. A light wind came up from the southeast, and I changed the course to northwest to bring up to the New Guinea coast.

Photograph by George R. King

THE BASKET MAKER SMILES FROM HER DOORWAY

Over the terrace floor (see page 168) is spread a layer of "Samoan feathers"—pebbles from the beach—to serve as a carpet. The mat does duty as a chair by day and as a bed by night.

Sunday, June 10, was a memorable day on board the *Islander,* for on that day I sighted land beyond the Pacific Ocean. Soon after sunrise low islands were seen on the starboard beam, and a few hours later the cloud-capped mountains of New Guinea appeared.

My chart of the southwest Pacific did not show local features of the New Guinea coast, and I approached the mainland beyond South Cape cautiously, looking for reefs, but saw none. For several days I sailed slowly along the shore, enjoying the scenery of the majestic Owen Stanley Range.

One morning I awoke to see two small islands astern, and whether the *Islander* passed between them or to one side I did not know. A little later I saw breakers ahead and came up to the barrier reef that from this point stretches along the New Guinea shore to the westward.

As I coasted along I could see Papuan canoes sailing in the quiet water behind the reef and occasionally a picturesque Papuan village perched on stakes above the water (see page 181).

Photograph by George R. King

SAMOAN HOUSE CONSTRUCTION

Owing to a warm climate, the Samoan likes plenty of air. He uses no nails in building his home; the parts are tied together with lengths of coconut fiber, some of which is as fine as twine (see, also, page 168).

Seeing European houses on a hill, I found an opening in the reef, and after much winding about among small islands and shoals, I came up to a wharf at the head of an inlet. Here I found that I was in Bootless Inlet, where a copper mine was being opened up, and that Port Moresby was a few miles farther up the coast.

### THE "ISLANDER" GOES ON A CRUISE WITHOUT A SKIPPER

I lay at anchor while I rested and had a good sleep. The next morning, after getting a little information, I beat out of the inlet and sailed along in the quiet water behind the reef and came to anchor at Port Moresby (see page 181).

Port Moresby is built on a wind-swept peninsula and is quite healthful, but at its back door is a region where the clouds and mists hang continually, and the people coming in from the outlying districts complained of fever.

Near by is the village of Hanauabada, whose natives are a maritime people. Their racing canoes may be classed among the swiftest racing craft in the world, and much cash changes hands among the white residents of Port Moresby over the results of the contests (see page 182).

I had rather an unpleasant experience

THE "ISLANDER" AND THE "TASMAN" IN NAVUA RIVER, VITI LEVU ISLAND

One hundred and fifty-six members of the National Geographic Society in the Fiji Islands will read with interest of the author's visit to their archipelago.

at Port Moresby. I had been spending the evening ashore with friends, entertaining them with photographs and listening to tales of savages and cannibals.

I started for my ship at about 11 o'clock, thinking what a wonderful thing it was to be alive. It was a dark night and the wind was blowing a gale right offshore. I got in my skiff and rowed out in the darkness, but there was no *Islander*. She had gone on a cruise by herself, leaving me on the beach with only a book of photographs under my arm!

I spent a most uncomfortable night, but the next morning we found her anchored out to a reef. Apparently she had got by the reef without striking, but the anchor had hooked in the coral. When we pulled in the anchor, we found the stock broken out, which probably explains why the boat went adrift.

From Port Moresby I sailed along the New Guinea shore and anchored the next day at Yule Island, in Halls Sound. It would have been a pleasure to linger in this wonderland of beautiful scenery and strange people, but I was expecting letters at Thursday Island; so, after a few days, I sailed out of Halls Sound and stood away for the Bligh Entrance to Torres Strait.

I sailed from Yule Island on July 1. The day was fair, with a light wind.

One wishes for good weather when passing through Torres Strait,* and at

* See, also, "Geography and Some Explorers," by Joseph Conrad, in the NATIONAL GEOGRAPHIC MAGAZINE for March, 1924.

A BANANA MARKET ON THE NAVUA RIVER

THE WATER FRONT AT SUVA, CAPITAL OF THE FIJI ISLANDS

At the left is the floating native market. On the rolling hills which encircle the harbor, 1,500 Europeans make their homes.

this time of the year might expect it, but on the second day out the sky clouded up and the wind blew hard, raising a choppy sea in the shallow waters. I ran on under shortened sail, keeping a close watch for Bramble Cay and Darnley Island, but missed them in the darkness.

Morning came with mist and rain, and for most of the day I was lost in a maze of reefs and sand cays. I had a chart of Torres Strait, but the weather was too thick for me to see the landmarks.

Later the mist lifted and I made out my position to be between Bristow Island and the Warrior Reefs, but night was coming on when I began to beat out to gain the open water to the eastward, and Bristow Island and the sand cays faded out in the darkness. At 2 o'clock I hove to, but all night long I listened for the sound of breakers.

July 4 dawned with no land in sight, and off in the southeast a rain squall was approaching. I headed off to the south, looking for islands. Eventually I saw coconut trees showing through the mist and came up to Dalrymple Island.

At noon I anchored in the lee of Rennel Island and made the acquaintance of Tom Savage and his family. They owned the island and turned out the best it afforded for me. I was tired with constant watching and the loss of two nights' sleep, so I lay all the next day and rested. When I was ready to sail, the islanders gathered sweet potatoes, green corn, and pumpkins for me to use on my journey.

For two days more I sailed around among islands and reefs, on a wet, choppy sea, and came to Thursday Island. That same day the sky cleared, and for the rest of my stay in Torres Strait the weather was fine.

A BASKET OF FRUIT PRESENTED TO THE AUTHOR BY A FIJI CHIEF

While these dawas, which resemble dark blue plums, were very palatable, Captain Pidgeon says that he did not eat the entire basketful at one sitting.

### DECIDES TO CIRCLE THE GLOBE

At Thursday Island I decided to return to California by way of the Cape of Good Hope and the Panama Canal.

The *Islander* was in need of repairs and paint, for she had scraped on many a reef since coming off the ways in the Fijis. I moved over to a quiet cove in the lee of Prince of Wales Island, beached the boat with the spring tide, and went to work.

FIJIAN HOMES

While the climate of the Fiji Archipelago is similar to that of the Samoan Islands, the dwellings here differ radically from the open, airy structures found in the more easterly group (see illustrations, pages 168 and 172).

THE TRAVELER'S PALM, A PLANT NATIVE TO MADAGASCAR, TRANSPLANTED TO THE FIJI ISLANDS

FIJI GIRLS OF MBENGHA, A SMALL VOLCANIC ISLAND LYING SOUTH OF SUVA, VITI LEVU

MEN OF ATCHIN ISLAND ON A HAMIL GROUND (PLACE OF WORSHIP)

TRANSPORTING THEIR GODS: NEW HEBRIDES

These natives of Atchin, an islet near the north end of Malekula Island, are dragging in an idol to set up on their *hamil* ground (see above). Note the muscular development of these men.

THE JAWBONES OF SACRED PIGS FESTOON THE WOODEN IDOLS OF ATCHIN

During his stay in the New Hebrides the author witnessed a weird ceremony at this place of worship (see page 170).

With a piece of ironwood spiked on the keel, a little cement, and a good coat of copper paint over all and the *Islander* was as fit as ever. I also cut a supply of firewood for my cookstove. There were bees in the tree that I cut for wood and I had honey. The bees were very small and stingless. They stored their acid-sweet honey in small round cells that much resembled fish eggs.

### OFF LIKE A WILD BIRD INTO THE INDIAN OCEAN

On August 7, 1923, I sailed from Thursday Island. It was after 3 o'clock when all was ready for sea. A half gale was blowing, and I thought of waiting over for another day, but the *Islander* was ready and impatient to take her first plunge into the Indian Ocean; so I up with the anchor, and she was off like a wild bird!

The tide was against her, but, running before the wind, she passed Booby Island before sunset. When darkness came on, I took down the mainsail and slept, while the boat drifted out on the Arafura Sea.

For several days I sailed before a light east wind, through green water, where many sea snakes swam about, and each night the sun set in a red haze that was drifting out from Australia.

As the sun was setting on the tenth day out I sighted Timor. For two days I coasted along this great island, which is more than 250 miles long, and high and

BOAT MAKING IN THE NEW HEBRIDES

PIGS ARE BRED FOR THEIR TUSKS BY NATIVES OF THE NEW HEBRIDES

The upper tusks are broken out; then the lower tusks, having nothing to oppose them, grow out in a curve, enter the jaw, and come out again. This pig's tusks have completed one full turn and have a good start on a second turn. When the pig has been sacrificed before the idols, its jaw will be preserved in the hamil ground (see illustration, page 179).

PORT MORESBY, METROPOLIS OF NEW GUINEA

A VILLAGE ON STILTS

More than half of the great island of New Guinea, which, next to Greenland, is the largest on earth, is now under the jurisdiction of the British Empire. The Australian Government is exercising a mandate from the League of Nations over that portion of the island formerly known as German New Guinea.

THE SAILING CANOES OF NEW GUINEA ARE AMONG THE SWIFTEST WIND-BORNE CRAFT IN THE WORLD

Boat racing is one of the chief diversions at Port Moresby, and the white residents wager considerable sums on the outcome of such contests.

THE HUSBANDS OF NEW GUINEA BELIEVE THAT IN UNION THERE IS STRENGTH

In many of the villages the married men live apart from their families, in great community clubhouses like the one in the center of the picture. Each man is assigned an apartment that corresponds in size and location to his wealth in trophy skulls. Since no woman ever dares to enter these buildings, there is no danger of the gruesome treasures they harbor being disarranged during house-cleaning activities.

NEW GUINEA CARPENTER MAKING A MODEL CANOE

This young woodworker has the advantage of the enlightened man's tools—note the hammer.

mountainous throughout. Portugal owns the eastern, the Netherlands the western, part.

I had no chart of the region, but I found my way through the Strait of Semao and came up off Koepang, the port of Dutch Timor (see page 186). At this quaint place I rested for a week, laid in a supply of fruits and vegetables, and then sailed for Christmas Island. The wind was fair out of Koepang Bay, but I drifted by the islands to the west, almost becalmed; then I met the southeast trade wind and sailed away.

For several days the trades were light, and the *Islander* sailed leisurely on to the west, helped by a westerly set of the current. It was at such times that I felt the monotony of being alone, but occasionally something of interest occurred to attract the attention.

### A WHALE COMES ALONGSIDE

One evening, at dusk, when the silence seemed almost painful, a whale rose to the surface and spouted close alongside the *Islander*. The deep, long-drawn-out sound of his breathing was startling and the proximity of this great creature gave me a feeling of awe. However, all of these mammals, so far as I have observed, travel very leisurely when not alarmed, and it seems reasonable to suppose that they become aware of the presence of anything in their path in time to avoid coming into collision with it.

In these latitudes the phosphorescent sea sometimes takes on a very strange appearance at night. Once, when the water was quite smooth, the whole expanse resembled a plain of snow, over which the *Islander* glided like a phantom ship.

But one morning the wind was blowing fresh and strong. Soon after sunrise I sighted the outlines of Christmas Island among the clouds ahead. As I came into Flying Fish Cove I was surprised to see a steamship at the pier, decorated with bunting from stem to stern. A pilot came off and made my boat fast to a buoy, and then invited me to come on board the

AN ANT HILL ON PRINCE OF WALES ISLAND, TORRES STRAIT

*Islander,* for, strange enough, the name of the ship was the same as that of my little craft. The steamer belonged to the company that was working the phosphate deposits on the island, and a party was being given on board. I had arrived just in time for dinner.

Christmas Island is of raised coral formation, standing more than 1,000 feet above the sea. It is covered with a dense forest. Many land and sea birds make the island their home, and there are land crabs here with claws that will break open a coconut. The whole island is under lease to the company operating the phosphate plant (see page 187), and several of the European employees had their families with them; hence the merry party on board the steamer *Islander.*

I spent five happy days with the people of the island, and sailed well supplied, through the generosity of the manager. The sun was setting as I made sail, and my hosts, who gathered on the pier and watched the *Islander* glide away in the dusk, no doubt thought me strange indeed to sail at that hour.

When I had finished plotting my position from observation of the sun on the fifth day out, I began watching for the Cocos Islands (see page 188). At half past 1 o'clock the tops of coconut trees were showing above the sea, and all around myriads of birds were busy fishing.

### WHERE THE "EMDEN" ENDED ITS SPECTACULAR CAREER

Cocos or Keeling Islands, about 20 in number, are scattered along a coral rim of horseshoe shape inclosing a lagoon about nine miles long, with an opening to the north. Capt. J. Clunies Ross took possession of them in 1827, and they are still owned by the Ross family, which owns Christmas Island as well.

On Cocos Islands is an important cable station of the Eastern Extension Telegraph Company. A large staff of operators is employed in relaying messages across the wide expanse of the Indian Ocean. Exiles they call themselves.

When the *Islander* arrived they were having a run of visitors, as a short time previously a small craft, the *Shanghai,* in which three hardy adventurers were making a voyage from Shanghai to Denmark, had made them a call. They had thought the *Shanghai* a small boat with a

LOOKING OFFSHORE FROM KOEPANG, TIMOR, DUTCH EAST INDIES

Note the outrigger construction of the sailing craft in the foreground.

small crew, and were very much surprised when the *Islander* came in single-handed from America.

I was well entertained and my hosts were interested in the story of my voyage, while I was no less interested in hearing them tell of experiences in some odd corners of the world.

### THE SCENE OF THE "EMDEN'S" LAST FIGHT

During the World War the German cruiser *Emden* sent a landing party ashore at Cocos to destroy the cable station. Before they finished their work the Australian warship *Sydney* came up and drove the *Emden,* a battered wreck, onto the reef at North Keeling Island.

When the German landing party saw the fate that was overtaking their vessel, they took possession of a small ship belonging to the governor and made their escape. He recompensed himself by salvaging the valuable material from the wreck of the *Emden,* and when I visited the islands the brass and bronze of the wrecked warship were being turned into boat fixtures in his shipyard.

On the afternoon of September 23 I sailed on the long, long run down the Indian Ocean from Cocos Island to Rodriguez. A good breeze was blowing as I cleared the islands and reefs; then a dark, ominous cloud came rolling along from the southeast. The *Islander* drove off to the west before a gale, and I lost sight of the islands in the blinding rain.

### THE SHIP SAILS ALONE WHILE THE MASTER STAYS BELOW

For several days the weather was stormy, with a rough sea, and I did not feel well. With only the jib and reefed mizzensail set, the *Islander* sailed on day and night, while I stayed below out of the wet. Under this short sail, in one night, from sunset to sunrise, the vessel covered 70 miles; but I was being tossed about too much to sleep well.

It was on such days as these, after enjoying myself with friends on shore and then sailing into gloomy weather, that I felt the solitude. But the first few days were the worst; then I began to look forward to my arrival at some new land and to speculate on what it would be like and whom I should meet there.

THE PHOSPHATE QUARRY ON CHRISTMAS ISLAND

This flat summit of a submarine mountain, rising 15,000 feet from the floor of the Indian Ocean, was uninhabited when Europeans arrived, 30 years ago, and discovered its phosphate deposits, which are worked in much the same fashion as those on Nauru. (See "Nauru, the Richest Island in the South Seas," in the NATIONAL GEOGRAPHIC MAGAZINE for December, 1921.)

There was a week of stormy weather, and then the trade wind fell light and at times I was almost becalmed.

### A BOMBARDMENT BY SQUIDS

One day, when the *Islander* was sailing along before a good breeze, a school of small squid came on board from aft. They passed my head as if shot out of a gun, striking the sails and rigging with such force as to knock off the heads of some.

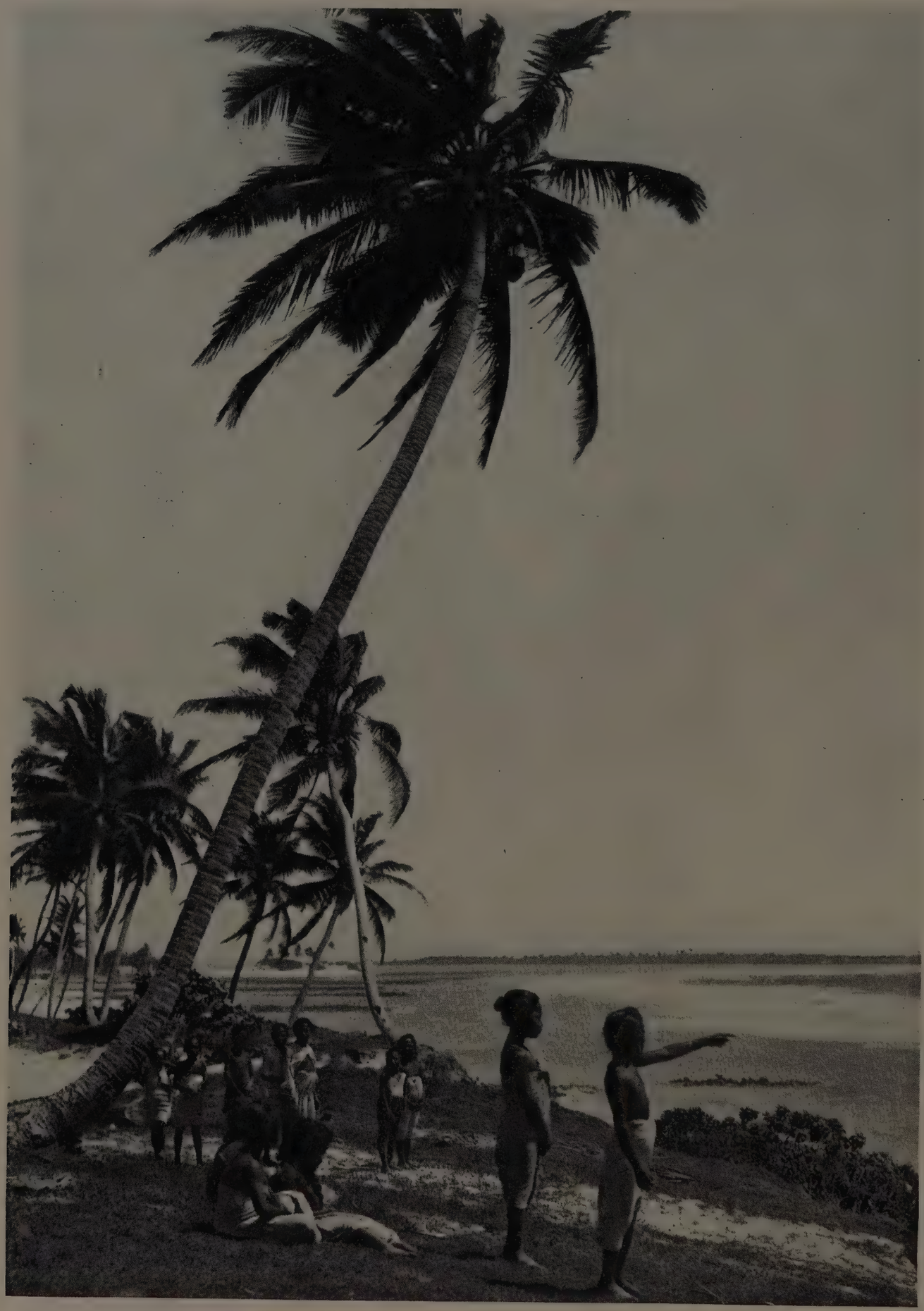
They were evidently trying to escape an enemy that was pursuing them in the water, and took to the air in an effort to elude their pursuer. I was very much astonished, as I had never heard of squids taking to the air like flying fishes, and I do not think this fact is generally known to the layman. Later I observed many of them. They dart from the water with great speed, and as they leave the surface they eject a stream of water behind. They do not glide so far in the air as the flying fish, nor is their flight as well directed.

On the evening of the twentieth day out a blue peak was seen in the west. Early the next morning I reached the island of Rodriguez, and while I was looking for a channel through the reef a picturesque old pilot came out and directed me to an anchorage in the inner harbor (see page 189).

Rodriguez is a small mountainous island surrounded by reefs that in places extend more than four miles offshore. It supports a population of more than 7,000 inhabitants by fishing and agriculture, though I did not see an animal-drawn vehicle on the island.

This is one of the happiest of isles, where the people live in great simplicity. The cable station adds greatly to the importance of the place, and the members of the staff exerted themselves to make my stay pleasant.

Before the gentlest of winds I sailed from Rodriguez. On the second day out I crossed a meridian halfway around the world from my home port. After four days of light weather, the wind breezed up and blew hard, with rain, sending the *Islander* flying down to Mauritius.



MOST MALAY CHILDREN ARE AT HOME ON BOTH LAND AND SEA

Among the islets of the Indian Ocean known as the Cocos, or Keeling Group, Charles Darwin found his "typical" example of an atoll, or lagoon island. There is an important cable station on the principal islet, and it was here that the famous German raider *Emden* was destroyed during the World War (see text, page 186).

THE GOVERNOR OF COCOS ISLANDS (CENTER) IS A LINEAL DESCENDANT OF THE SCOTSMAN WHO SETTLED HERE WITH HIS FAMILY A HUNDRED YEARS AGO (P. 185)

The author is on the governor's left. The only export from the Cocos Group (except relayed cable messages) is coconuts, and one of the commonest of living creatures is a gigantic crab which feeds on the nuts.

The people of Mauritius took a great interest in my voyage, and scarcely a day passed without someone showing me some special kindness. Mauritius is a beautiful place and I had many opportunities of seeing it. Friends came with motor cars to show me about, and I was given a pass over the Mauritius Railway.

I spent a month amid pleasant surroundings and would have lingered, but with the coming in of December the people began to talk of hurricanes, and it was time for the *Islander* to sail again.

On the fourth of December I put to sea. When night came on, the wind fell light, and Mauritius was still in sight at the end of the second day. It was the third day when I drifted by Reunion Island, a remarkable body of land that rises from the Indian Ocean to a height of more than 10,000 feet. I longed to go ashore, but the season of hurricanes bade me hurry from these latitudes.

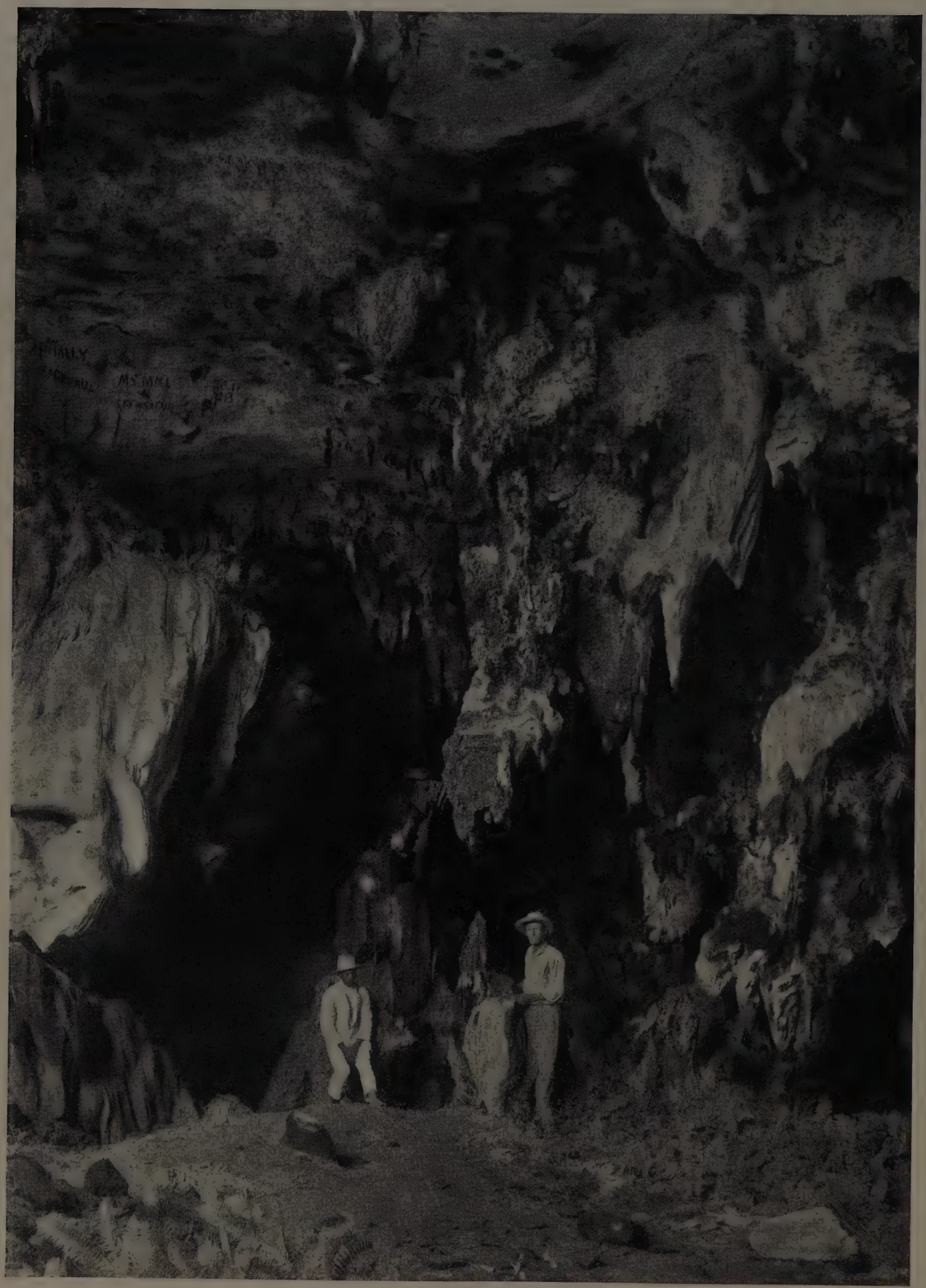
A strong wind sprang up and I rapidly left the deeply scarred mountains of Reunion behind. In a few days the southeast trade winds, that had carried me so far across the Pacific and Indian Oceans, died down, and as I approached Madagascar a storm blew up from the south.

### A ROYAL RECEPTION TO AFRICA

For two days I sailed by a vast black cloud that hung over the island. On the second day the cloud lifted and I had a clear view of Cape St. Mary.

After passing it I met with light, southerly winds. A week later I had my first sight of Africa. As I approached the coast, a gale came down out of the north, and all night the *Islander* lay hove to, plunging into a head sea. The gale blew itself out by morning, and the last of the north wind brought me into the harbor at Durban, capital of Natal Province.

At no place was greater interest taken in my voyage. A continual stream of visitors came on board. Nor did they all come to see only. At least twenty made application for a berth on the *Islander*.



AMONG THE CAVES ON RODRIGUEZ ISLAND (SEE PAGE 187)

On the western side of this interesting island is a wide plain studded with many limestone caves. As on Cocos Islands, a British cable company maintains a large staff of employees here.

ONE OF THE HAPPIEST OF ISLES—RODRIGUEZ

For twenty days the author sailed westward across the Indian Ocean from Cocos Islands before he sighted the blue haze of a peak which resolved itself into Rodriguez Island, where he was the recipient of much gracious hospitality (see text, page 187).

The idea of seeing the world from the deck of a small vessel appeals to many.

I had intended sailing around the Cape of Good Hope in February, but I was detained and was still at Durban, telling the people about my voyage, when the worst southeaster in years swept the Cape. When it was over I put to sea.

I sailed from Durban for Cape Town on February 27, 1924. I met with much head wind and at times with little wind at all. For two days I lay hove to in a westerly gale on the Agulhas Bank, with the big seas driving the boat back along her course.

In another westerly gale I lay under the shelter of Cape Infanta for two days. All the time I was sailing in sight of the great sand dunes of the African shore and right in the track of the steamers passing around the Cape of Good Hope.

With a strong east wind I passed Cape Agulhas, the southern extremity of Africa, as the sun was rising, and before midnight I had rounded the Cape of Good Hope.

When I came up under the shelter of the land, I let the *Islander* run on under easy sail, while I went below and turned in, for I was wet, cold, and tired. When I came out in the morning the vessel was becalmed in the lee of Table Mountain.

Here I drifted most of the day before getting into Cape Town; but I was content, for behind was the stormy cape and before me lay the grandest sight the whole world around (see page 194).

## MANY SEEK TO JOIN THE "ISLANDER'S" CREW

Among the first of many visitors to come on board at Cape Town were members of the Royal Cape Yacht Club, and I have many pleasant memories of my association with those good fellows.

I have never seen a city with a grander setting than Cape Town, and the climate, which is much the same as that of California, was appreciated after my two years in the Tropics.

While I rested from the sea, I had many interesting excursions around the

WHERE PAUL AND VIRGINIA ROAMED

The author was the recipient of many courtesies, including a pass over its 150 miles of railway, during his stay in this Indian Ocean garden spot, the island of Mauritius, which has been a British possession for more than a century, but is still largely French in language and habits. The island is the scene of Bernardin de St. Pierre's famous romance, "Paul et Virginie." Thirty members of the National Geographic Society live on Mauritius.

wonderful Cape Peninsula and Table Mountain.

One of my yachting friends arranged for a cruise to some small islands off the coast that were the breeding place of innumerable sea birds, where the penguins and gannets showed no more fear of men than so many barnyard fowls (pp. 197-8).

I received as many applications for the position of mate on the *Islander* at Cape Town as I had at Durban, and they were not all of the sterner sex either. But, after rounding the stormy cape alone, I was determined to bring my vessel home single-handed.

### HIGH AND DRY ON THE BEACH

On June 3 I sailed for St. Helena. The expected southeast wind came up light, and for two days I drifted slowly north along the coast, too close to sleep with any feeling of security. On the third night out, when I was a little farther out, I went below to get some rest. I slept, and awoke when the boat took to the ground.

I sprang up to find that I was in the breakers, and that the wind had shifted to the northwest. It did not take the sea long to throw the boat up on the beach, and when the tide went out I could walk all around her.

With daylight I found that I was in a small bay, with a sand beach at the head and rocks on either side. The *Islander* had chosen her resting place well. From Saldanha Bay to Paternoster, a distance of 25 miles, the coast is all rocks except one sandy cove, Northwest Bay, and into this place she had found her way (p. 196).

The same day that I went on shore I met the manager of a large estate belonging to a resident of Cape Town. Almost the first words that he said to me were, "When the weather gets so that we can, we will come and take you off."

By this time the northwest wind was blowing a gale, and the big seas coming into the bay broke over my craft. The backwash was strong enough to throw her over the keel and downhill. The sea, coming in, would throw her back again, and she lay rolling from side to side until I got out a line from the top of the mainmast to the shore.

The storm passed, and with good

weather my friend in need came with a crew of men and a tugboat from a lobster cannery at Paternoster and put the *Islander* back into her element once more.

They wanted to know what else they could do for me, but the boat was not badly hurt—she had not even started a leak—and, with her once more afloat, I could shift for myself. I sailed back to Cape Town, where three days' work put her in as good condition as ever, and her cargo had not been damaged in the least.

It was now winter at the Cape and northwest gales were frequent, so I decided that it would be more profitable to remain in pleasant surroundings than to be contending with stormy weather.

THE AUTHOR HIRES A ZULU "TAXI" IN DURBAN

The largest city of Natal, South Africa, has no more impressive sight than the ricksha boy, with his headdress of curving horns and colored feathers, and highly decorated, whitewashed legs.

### HOMEWARD BOUND VIA ST. HELENA

The time passed quickly and with September I was making ready to sail once more, and when the *Islander* put to sea she was in better condition and better supplied than when she left her home port.

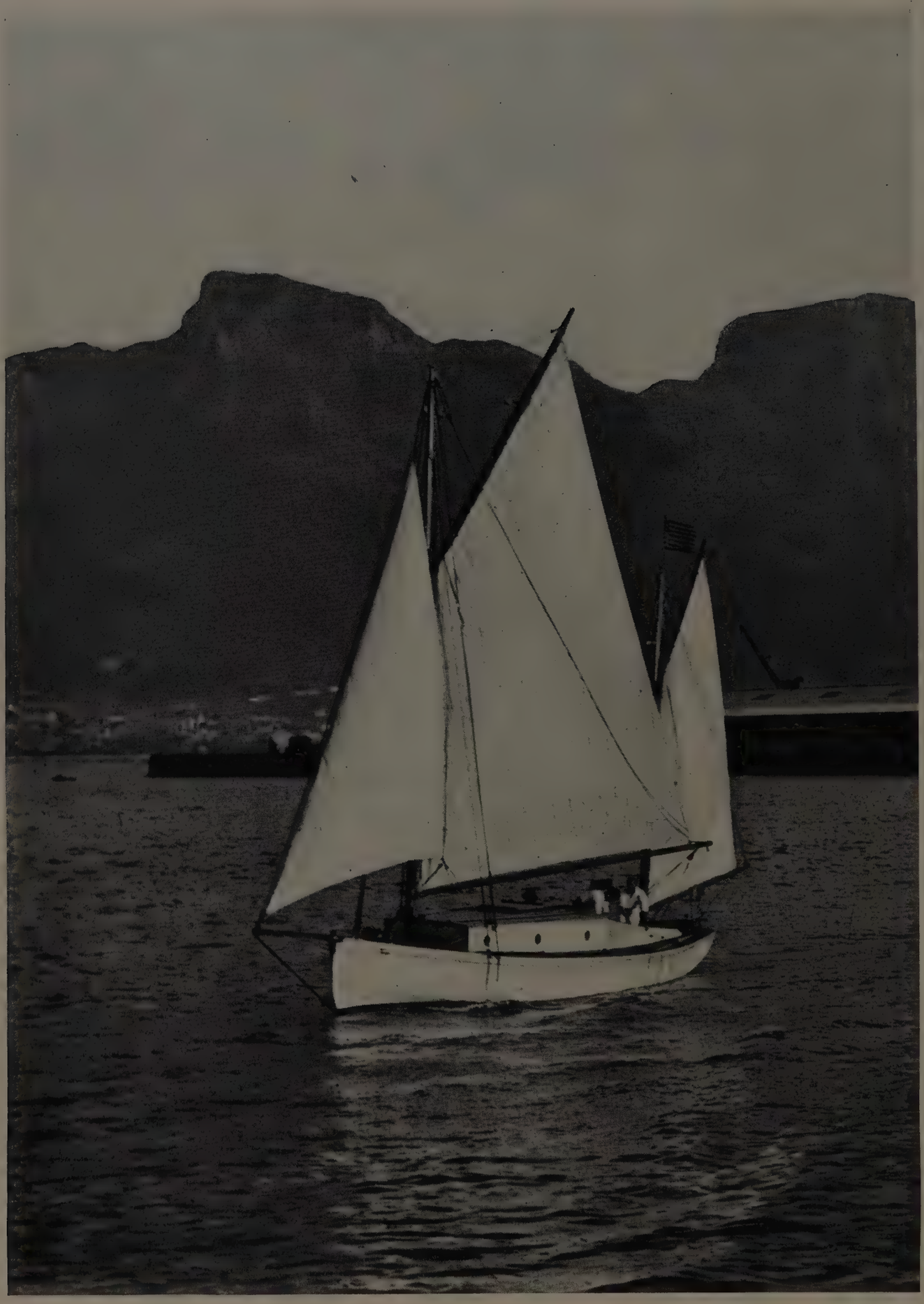
On September 22 I sailed from Cape Town for St. Helena and homeward bound. A southeast wind was blowing and held on. At nightfall I was nearing the place where I had met disaster before. I lay a course to the northwest and carried on all night long. When morning came only a haze on the horizon indicated where Africa lay.

It was springtime at the Cape when I left, and I expected to run right into warmer weather, but instead it was cold and gloomy. The wind continued fair and I ran into the southeast trade winds, but never had I seen so much cloudy weather in the trades. I seldom had an unobscured sight of the sun, and I began to fear that I should miss the island.

On the seventeenth day out I had a fair observation of the sun and calculated my position to be about 60 miles to the east of St. Helena. When night came on I hove to. Morning dawned with clouds and gloom, but I had not been under way half an hour when the clouds opened in the west and I saw the outlines of the cliffs of St. Helena.

From the sea, St. Helena has a bleak, desolate appearance,* but up to the high-

* See, also, "Sindbads of Science," by George Finlay Simmons, in the NATIONAL GEOGRAPHIC MAGAZINE for July, 1927.



THE AUTHOR SAILING IN TABLE BAY, CAPE TOWN

In this harbor, which once sheltered the tiny ships of Vasco da Gama, mighty steamers now tie up at the wharves behind the breakwaters. Here, as at Durban (see, also, page 193), the author received numerous applications for the position of mate on the *Islander*.

THE LIGHTHOUSE ON THE CAPE OF GOOD HOPE

"Good-bye and Good Hope" is South Africa's farewell to the departing voyager.

lands, where the trade winds give up their moisture, there are scenes as beautiful as there are to be found in any country.

St. Helena has some good roads, but there are no motor vehicles in the place. A motorcycle was once brought to the island, but it was not allowed to be taken off the wharf.

Arrangements were made to have me tell about my voyage, which I did to a crowded house. But there were some that did not get to hear it, so I had to tell about it once more.

In 1898, when Capt. Joshua Slocum was circumnavigating the world in the *Spray,* he called at St. Helena, and Mr. R. A. Clark gave him a goat. Not having the heart to kill and eat it, he put it ashore at Ascension Island after it had eaten his chart of the West Indies and his last hat. Mr. Clark was still living at St. Helena, and I enjoyed hearing him tell of the incident, but I was not taking any live stock on board the *Islander.*

### POVERTY ASSAILS ISLAND OF ROMANCE

Formerly St. Helena was a prosperous place, but steamships and the Suez Canal have left it only an island of romance. Many of its inhabitants have had to seek employment elsewhere. There is a lace school, and very fine lace is made on the island, but many of the families depend on the workers who go out to other lands and send their earnings home.

The wind was light when I sailed from St. Helena, but eight days brought me up to Ascension Island, my next calling place.

Ascension Island is a lava bed above which rise numerous cinder cones. It is a desert except for the highest peak, Green Mountain, which pierces the trade-

THE "ISLANDER" GOES ASHORE

Although the 25-mile stretch of Cape Colony coast line between Saldanha Bay and Paternoster is studded with dangerous rocks, the *Islander* luckily picked out the one sandy cove in that area when it went aground at Northwest Bay. The crew of the small steamer offshore is working to put the sailing boat back into its natural element (see, also, text, page 192).

A GANNET COLONY ON MALAGASSEN ISLAND, SOUTH AFRICA

This 26-foot-high island lies near the entrance to Saldanha Bay, the only safe harbor on this section of the Cape Colony coast. It was used by the Dutch as a station for naval vessels and as a postal rendezvous for their East Indian possessions. The birds here, as well as the penguins on Dassen Island (see page 198), resemble barnyard fowls in their lack of fear of man.

THE "ISLANDER" LYING OFF ST. HELENA

Surrounded by forbidding cliffs which rise a thousand feet above a fisherman's paradise, St. Helena stands in splendid isolation far out in the South Atlantic, alone with its memories of the exiled Napoleon and of the days when it was the animated way station of the British East India Company.

PENGUINS ON DASSEN ISLAND, SOUTH AFRICA

This is one of the largest of the small rocky islands which lie near the mainland of Cape Colony. It is about midway between Cape Town and Saldanha Bay.

wind clouds and gets enough rain to support a growth of vegetation. Myriads of sea birds make the island their breeding place. The only people there are connected with the Eastern Telegraph Company and the Ascension Island Guano Company, but at no place was I given a more hearty welcome.

After the bird rookeries, the most interesting place on the island is Green Mountain. This peak rises nearly 3,000 feet above the sea, and up in the clouds, around the summit, is a farm where vegetables are grown and a few cattle and sheep find pasturage.

On the summit is a lily pond. Around a shallow pool a thicket of bamboos has been planted. The clouds and fog condense on the bamboos and the water runs down into the pool. It is called a dew pond—a novelty for a desert island.

A LACE MAKER OF ST. HELENA

Although fine lace is made at a lace school, many families are dependent on the earnings of their children who seek their fortunes in other lands.

### IN COLLISION!

On December 15 the *Islander* left Ascension on a course for the West Indies. The wind was light and she sailed along, with something occurring now and then to mark her passage. First, we sighted Fernando Noronha; then we crossed the Equator and ran into squally weather. Out of clouds and rain, we met the northeast trade wind, blowing fresh across the Brazilian Current and stirring up a most uncomfortable sea.

Shortly after midnight, on January 10, the vessel was cruising along under jib and mizzensail when I was awakened from a sound sleep, as she struck something with a crash. I sprang up to see the black hull of a steamer alongside, with the *Islander* up to windward.

I threw the tiller over and tried to bring the boat up into the wind. Just then someone threw a line and said, "Have a rope!" For a moment I was dazed, and then it dawned on me that I was expected to leave my ship and climb up the rope! Actually they were trying to rescue me.

My answer was not very polite, but it was to the point!

This was the most thrilling five minutes of my voyage. One minute I was down under the bilge of the steamer and the next up on the rail. A backwash from the side of the steamer threw my boat off and she came up into the wind and ran clear.

The oil transport *San Quirino,* bound from Los Angeles to Buenos Aires, had taken the *Islander* for a ship's boat and had come up to offer assistance. After

MAN-OF-WAR BIRDS HAUNT THE IRON-BOUND COAST OF ASCENSION ISLAND

This volcanic heap is a geologist's nightmare. So recent are its formations that many scientists believe it to be the youngest of all Great Britain's possessions, if not the youngest island in the world.

repeatedly asking if I wanted to be taken off, the steamer was put on her course, while I went to work to effect some temporary repairs.

The bowsprit was snapped off and the rigging broken, so that I feared the masts would go. As quickly as possible I secured the broken rigging, and when the weather calmed a little a short bowsprit was made from a piece of the old one, so that I could set a small jib. On January 20 we crept into Port of Spain, Trinidad Island, like a bird with a broken wing.

Here I was shown courtesy by the port officials, and the collector of customs gave my craft a berth at the customhouse wharf, where she lay while I was seeing the sights of the charming island.

Here, amid beautiful scenery and plenty of interested spectators, I went to work and repaired the battered boat. When I had covered all with a coat of paint, only a scar on her side showed where she had come in contact with the *San Quirino*.

On April 18 the *Islander* sailed from Port of Spain, where she had received much kindness while she was recovering from her wounds.

### PASSAGE THROUGH PANAMA CANAL COSTS $8.75

A course was laid to pass to the north of all the islands off the South American coast, and I saw none of them, though vast numbers of sea birds flying about indicated that I was passing near.

The wind was light and I sailed slowly along until on the tenth day out I discovered Panama. The trade wind that had carried me across the Atlantic Ocean was now dying down and I drifted all the next day close by the San Blas Islands.

On the morning of May 2 I passed the

THE "DEW POND" IS A NOVELTY FOR DESERT ISLANDS

On the summit of Green Mountain, which rises for nearly 3,000 feet above Ascension Island, is a shallow pool, around which a thicket of bamboos has been planted to condense the clouds and fog (see text, page 199).

breakwater and came to anchor at Cristóbal, in the Canal Zone. The *Islander* had put another ocean behind.

At Cristóbal my ship was turned into a motor boat, with the addition of an outboard motor loaned by a photographer who accompanied me on an excursion to places of historic interest in the vicinity. The motor was retained while passing through the Panama Canal.

For the purpose of going through the canal the *Islander* was rated at five tons, and the charges were $5 for measuring and $3.75 canal toll.

A friend came along to act as engineer, and the *Islander,* along with the steamer *Orinoco,* passed into the locks to be lifted up into Gatun Lake. For a few days she lay at anchor at Gatun, while I watched the procession of great ships passing through the canal. Then I had a delightful sail among the green islands of Gatun Lake to Gamboa, where I was again joined by the engineer, who coaxed the motor into life. Another run as a motor boat brought the *Islander* down through the locks and Miraflores Lake at Balboa, at the Pacific end of the canal.

At Balboa I met Alain Gerbault, a Frenchman who had come single-handed from the Mediterranean in his cutter, the *Firecrest.* It was interesting to compare the cutter rig of his craft with the yawl rig of mine.

There is much of interest to be seen on one's first visit to the Canal Zone, but eventually I made ready for sea again.

The *Islander* was beached and carefully examined. Apparently she was as sound as when she sailed on the long voyage. Another coat of copper paint was spread over her bottom, for there was still a long voyage ahead; her best suit of sails was bent on and ample stores taken on board.

To the west of Panama, Central America, and the Mexican coast is a vast region of light winds and calms, varied by squalls of wind and rain. Of this region the sailing directions say: "The passage to the westward during the rainy season is a tedious affair. It often occurs that

PRESENT AND FUTURE CITIZENS OF JOHN BULL'S ASH HEAP

The eggs frequently lie in such close formation on Ascension Island that it is difficult to avoid stepping on them.

ANCHORED AT GASPAREE, TRINIDAD, AFTER REPAIRS

The vessel which had carried the author almost around the world went into "dry dock" on a suitable beach of Trinidad to be reconditioned after its dramatic encounter with the *San Quirino* (see text, page 199).

WIDE-AWAKES IN FLIGHT: ASCENSION ISLAND

When disturbed, the sea birds rise in deafening chorus and hang above the ground in a threatening blanket of wings and sharp bills that darkens the sun.

THE "ISLANDER" HOMEWARD-BOUND THROUGH THE PANAMA CANAL

In passing through the canal, the little craft temporarily departed from its proud estate as a sailing vessel and took on an outboard motor, with which it chugged its way behind the steamer *Orinoco* into Gatun Lake.

ACRES OF WIDE-AWAKES NESTING ON ASCENSION ISLAND

These birds breed four times in three years, on the clinker plains of this barren volcanic landspot in the South Atlantic. During the nesting season thousands of dozens of edible eggs can be gathered each week (see text, page 199).

twenty miles of westing are not made in a week, and it is only by the industrious use of every squall and slant of wind that the passage can be made."

On August 7 I stood out to sea on the last and longest run of the voyage and what proved to be the most difficult part of all. A light northerly wind carried us out of Panama Bay, and I passed Cape Mala at noon on the second day. Here I parted company with the stream of steam traffic passing through the Panama Canal and bore away to the southwest alone.

Down through the region of rain squalls and calms the *Islander* edged her way to west and south until she came out into the southeast trade winds in latitude 3° 43′ N. In the trades a westerly course was kept to longitude 110° W., a distance of some 1,800 miles to westward of Panama; then, bearing away to the northwest, I passed through the doldrums and into the northeast trade winds.

Continuing on into the northwest, I passed out of the northeast trade winds, and then, in latitude 30° N., when about 600 miles offshore, a north wind came up and I stood in for the California coast and home.

Eighty-five days is a long time to be alone on the sea, but I bore it well. Nor was it so monotonous as one might suppose. During the long passage through the doldrums, a day never passed without some excitement being occasioned by the squalls. The study of the weather, when one is depending on the wind, is a subject of never-ending interest, and one watches the approach of the last of a thousand rain squalls with as much interest as the first.

No part of the sea was so full of life as this. For more than a month a vast school of albacore and dolphins accompanied the *Islander* on her course. At night they appeared as great luminous wings stretching far on either side of the boat. In calm weather great numbers of turtles were seen floating lazily on the surface. There was a continuous flight of flying fishes striving to escape from the dolphins and albacore, often to be caught by the gannets and man-of-war birds that were always circling about.

Down in this part of the ocean I met with a squid similar to the flying or leaping squid of the Indian Ocean (see text, page 187), and often I would find more of these squid than flying fish on deck in the morning.

The dolphins swam close alongside, their dorsal fins cutting the surface. One of these I caught with the gaff hook and landed him in the cockpit, where he lay, a streak of gleaming silver dotted over with spots of brightest blue; a moment later he had turned to a golden color and the spots were brown. I made a spear out of a copper rod and caught several more. Of albacore I could have taken a shipload.

### TWO COMPANIONS FROM THE SKY JOIN THE SHIP

Two gannets came and took up their residence on board. On account of their colors, I named one Blue Bill and the other Yellow Bill. I drove them far aft, where each chose a roosting place which he seemed to recognize as his own. They spent the greater part of their time preening their feathers, but went off several times a day for fish.

Blue Bill was very quarrelsome, and I kept a stick handy with which to join in when he made an attack on Yellow Bill. The birds always sighted a shark before I did, and I usually became aware of the presence of one of these scavengers through the actions of my feathered companions.

From long drifting in tropical waters the bottom of the *Islander* became so foul with sea barnacles that her sailing was very much impeded. When I was becalmed I went over the side and cleaned them off with a scraper made from a block of hard wood on a bamboo handle.

At last I was clear of the steamy doldrums and sailed on through the trades. As the weather became cooler and the flying fish grew scarce, first Yellow Bill and then Blue Bill deserted.

San Clemente was sighted and on October 31, 1925, I cast anchor in Los Angeles harbor, after an absence of three years eleven months and thirteen days, during which the *Islander* had cruised around the world.

# THE WHITE CITY OF ALGIERS

By Lieut. Col. Gordon Casserly

Author of "Tripolitania, Where Rome Resumes Sway," in the National Geographic Magazine

THE long, sweeping curve of a crescent bay—the storied Bay of Algiers—here fringed with yellow sand, there, at one end, edged with gleaming black rocks, and everywhere backed by the steep slopes of a semicircular chain of low hills rising abruptly from the water's edge and crowned with white villas in verdant gardens flaming with Bougainvillæa and poinsettia.

Behind the hills lies the narrow, fertile plain of the Mitidja, in springtime blazing with the varied hues of wild flowers, the yellow of oranges, the green of cornfield and vineyard.

Towering above the plain in rugged grandeur the mighty chain of the Atlas Mountains, seeming, like the mythological giant whose name they bear, to support the heavens on their snow-clad shoulders. And the clouds gather round their peaks and leave the sky clear and blue, almost as blue as the waters of the Mediterranean below.

At one end of the bay are the spacious harbor, the busy wharves, and the terraced houses of a white city climbing to the hilltop.

Algiers, the White City! Its story runs from Hercules and the Golden Apples of the Hesperides through the forgotten chronicles of Numidian, Roman, Vandal, Byzantine, Arab, and Turk to the last of the Bourbon kings, to Napoleon III, and the French Republic. Not a century ago it was the haunt and headquarters of the cruelest, most bloodthirsty pirates that the world has ever seen; to-day it is a bright and beautiful city of modern France.

Alongside its quays lie great steamers being loaded with the produce of a bountiful land; its wharves are piled high with cask and case. Immediately over them rises a high, clifflike wall pierced with caves—merchants' warehouses and offices in vaults.

Along the summit of this wall stretches the beautiful Boulevard de la République, the beginning of a quarter that might rival the best bit of Paris between the Opéra and the Seine, a quarter of well-built streets, where the broad sidewalks shelter under arcades, of shady squares where white mosques front busy cafés and palm trees wave above the electric trams that link the town with the suburbs stretching around the curving bay (see pp. 225-226).

This is the quarter of theaters, hotels, and commercial offices, of attractive shops, of crowded streets where automobile and electric tram dispute the right of way with five-horsed carts. Well-dressed European men and short-skirted, silk-stockinged French girls pass veiled women and stately Arabs in flowing burnooses.

## WHERE ALL ONCE WATCHED FOR THE RETURN OF PIRATE CREWS

But a short distance back from the seaward wall the level ceases and the gayly colored, crowded houses climb on each other's shoulders up the steep hillside, as if striving to look over their neighbors' heads out to sea.

Here is the native quarter, and in it dwelt the pirate population that lived by bloody crime on the face of the waters. Every being in it—man, woman, and child, Moorish pasha and Christian slave—had a personal interest in watching each sail that lifted above the distant horizon. It might be an Algerine rover loaded with plunder and chained captives. It might be the herald of a Frankish fleet coming to batter down the pirate stronghold and set free the wretched slaves.

The flat roof of every house, then, must show its occupants the coming ship that might be friend or foe. It might bear the master of the household back enriched with spoils to deck his wives with additional jewels. It might bring the news of his death in battle—news that would scatter those wives to other harems or, if youth and beauty had deserted them, to the slave market or the beggar's corner.

Upward and still upward, house tops house, until one comes to the Kasba, once the palace-fortress of the Dey, the tyrant of Algiers, who claimed his share of the booty that each murderous seawolf brought home, whether it were plunder

THE BAY OF ALGIERS WAS ONCE THE LAIR OF CORSAIR

For three hundred years the very name of Algiers sufficed to bring consternation to the hearts of Mediterranean travelers. Its pirates continued to exact tribute from European shipping until finally subdued by the French less than a century ago.

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OLD AND NEW ARE STRANGELY BLENDED IN THIS TERRACED WHITE CITY

Beyond the series of great modern boulevards which rise from the busy water front of Algiers, there are sections of the one-time capital of the Deys which still suggest, in custom and in costume, the time and clime of the "Arabian Nights."

THE OASIS TOWN OF BOU-SAÂDA ATTRACTS MANY OULED NAÏLS

The girls of this tribe frequently leave their desert homes and go to the more populous cities to earn a dower by their dancing. When they have accumulated a sufficient amount they forsake their art for a home and husband.

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ALGERIAN GIRLS STILL WEAVE "MAGIC CARPETS"

Children are sent to work in rug and carpet factories as apprentices and they produce some fine reproductions of old oriental pieces. This work does not interfere with their education, for the simple reason that girls rarely receive any.

PREPARING THE CHIEF DISH OF THE DESERT

The couscous might be termed the Arab version of an Irish stew and is the *pièce de résistance* of most well-ordered Arab dinners. It consists of mutton or fowl and various vegetables, cooked separately, highly seasoned, and served together with steamed wheat dumplings.

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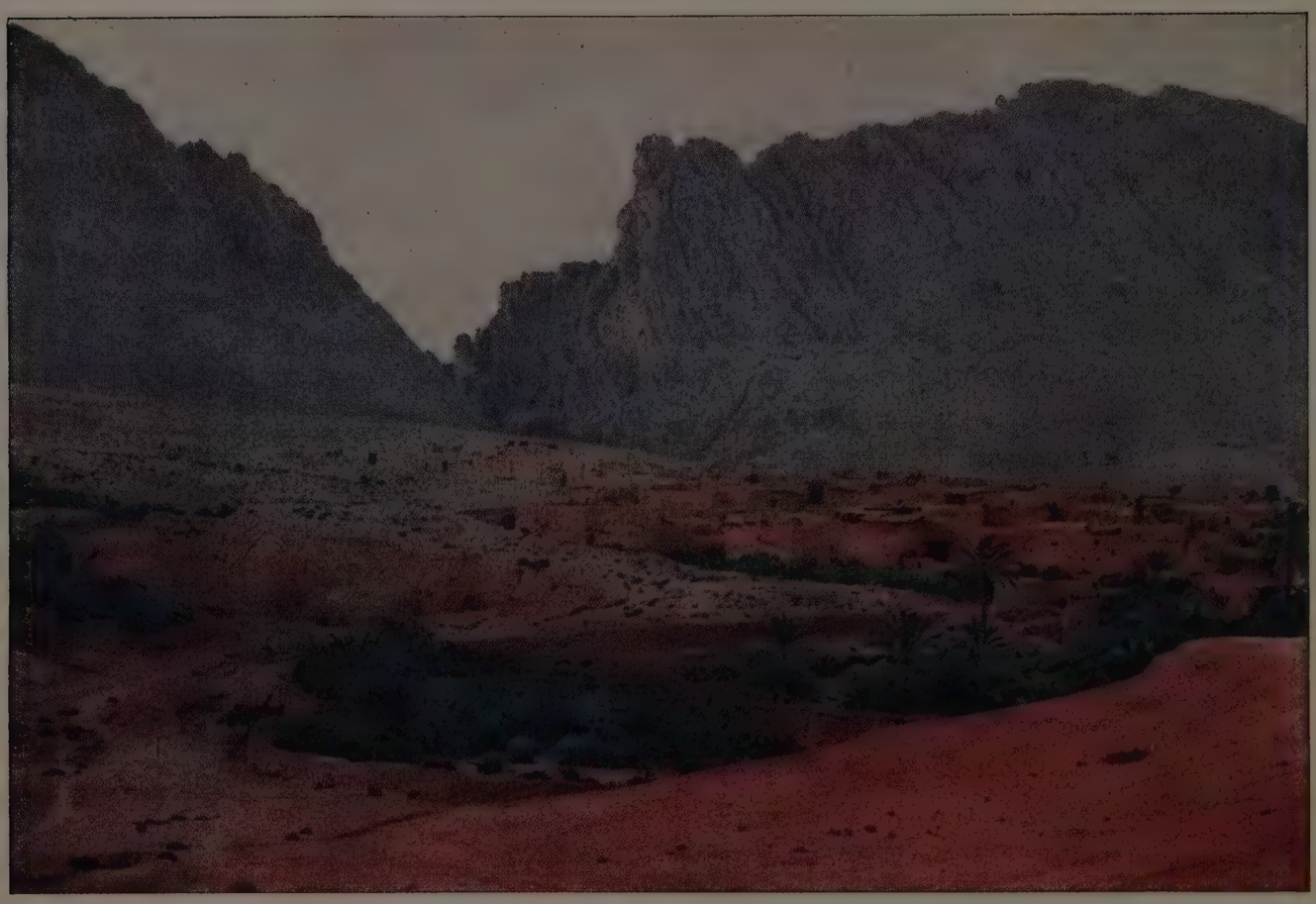
WHERE THE CENTURIES HAVE SEEN NO PROGRESS

Wheat and other grains are raised in the Algerian oases and are still threshed largely by woman's hand power much as they were hundreds of years ago. Manual labor is far cheaper in the desert than machinery.



THE GATE OF THE DESERT

According to Arab tradition the great rift in the rock wall at El Kantara was made by Hercules with a single twist of his foot, to form a gateway between mountains and desert. The place derives its name from the remains of a Roman bridge which are still to be seen near by.

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THE KORAN REPLACES THE THREE R'S IN THIS SCHOOL

In compliance with the injunctions of the Prophet, all Arab boys must learn the Koran. However, the language which they speak has drifted so far away from the pure Arabic of their sacred book that they can not understand passages they memorize, but simply repeat them parrot fashion.

THE ROAD TO GLORY IS SOMETIMES A ROCKY ONE

The heterogeneous individuals who comprise the French Foreign Legion have penetrated the Algerian Desert with good roads. Assignment to a long term of road-building work is one of the punishments for attempted desertion from the Legion.

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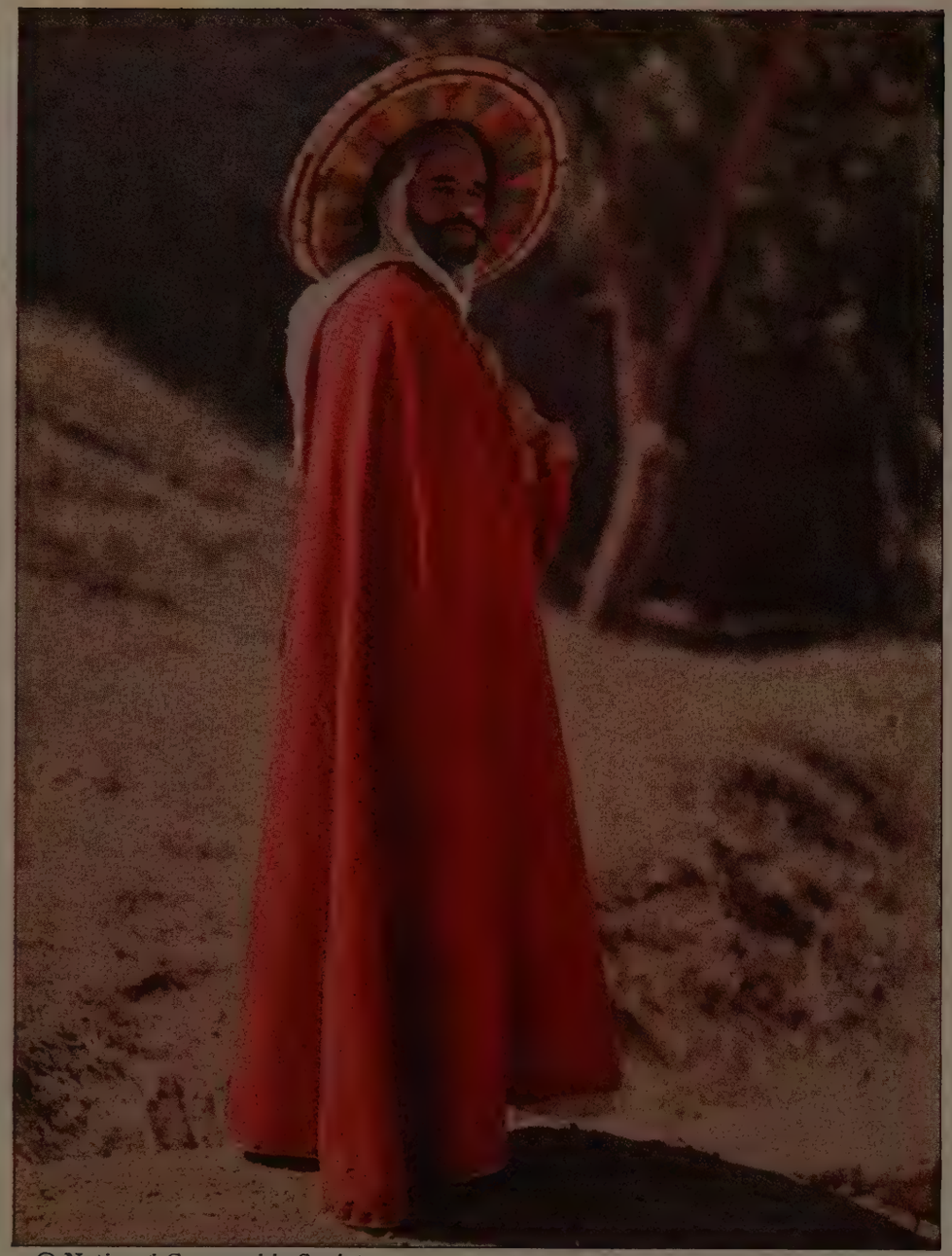
FRANCE'S FAMOUS FIGHTERS ANSWER THE MESS CALL

The motto of the Foreign Legion is, "No questions asked," and many a man buries his past under its uniform. The life of the *Légionnaires* seems romantic, but instead is the sternest reality.



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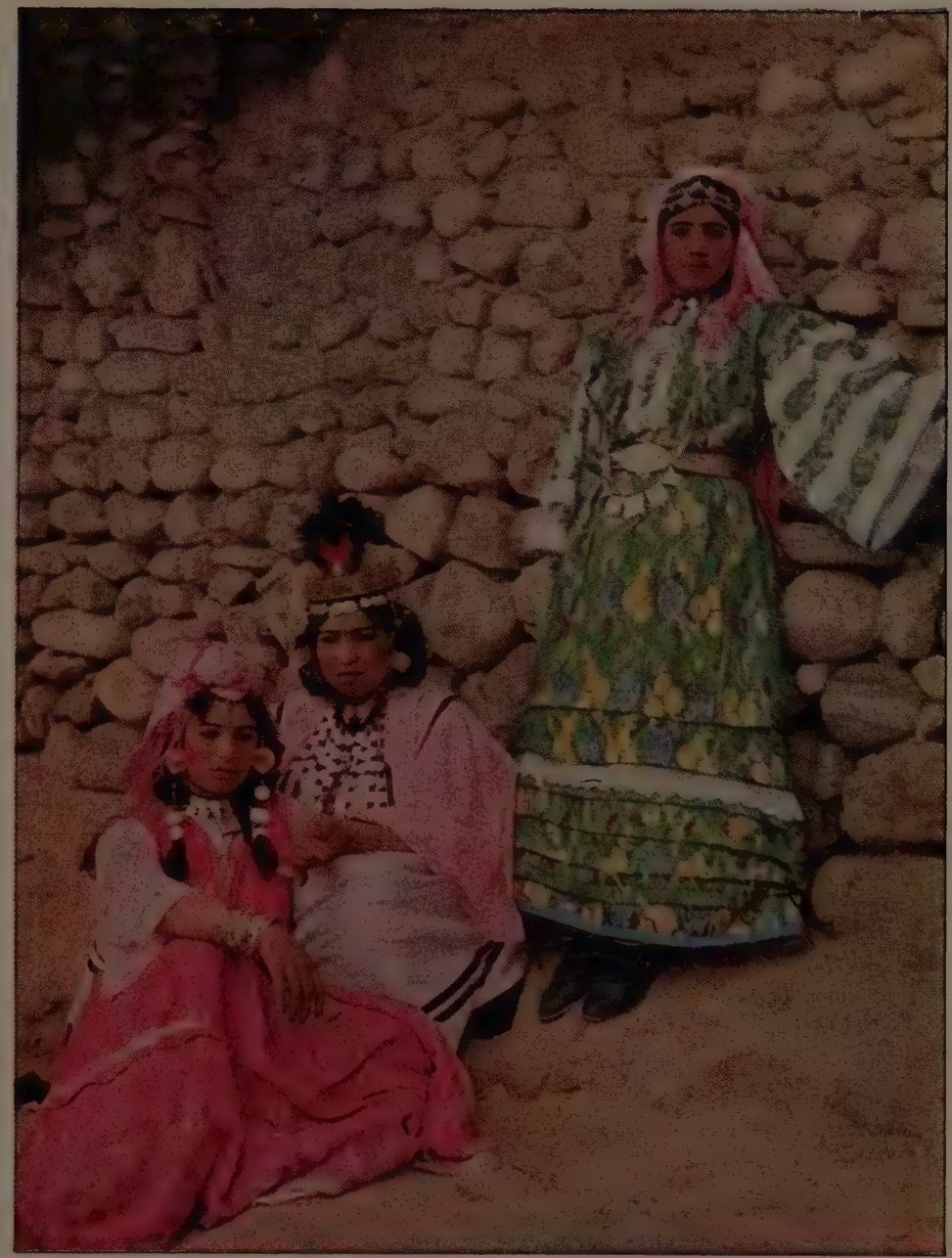
HIS SCARLET CLOAK DENOTES HIGH OFFICE

At the head of each Algerian tribe is a Caïd who dispenses justice according to tribal usage. These men frequently possess marked qualities of leadership and executive ability.



Autochromes by Gervais Courtellemont

THE FAME OF THEIR DANCING SPREADS AFAR

Throughout Algeria the dancing of the Ouled Naïls is known. These girls are very circumspect in their costume but execute a dance that greatly appeals to their Arab patrons.

© National Geographic Society

WELLS ARE IMPORTANT PLACES IN NORTH AFRICA

Until the French came to Algeria good water was a rare commodity. They introduced the artesian well to supplement the springs and surface wells of the oases.

Autochromes by Gervais Courtellemont

THESE ARAB BEAUTIES SCORN THE MOSLEM VEIL

City women generally throughout the Moslem world veil their faces, but the Ouled Naïl dancers do not and are consequently considered beyond the pale of polite society.

A WOMAN OF BOUZARÉA DOES HOMAGE TO HER DEAD

On Friday, the Mohammedan Sabbath, only women visit the cemeteries. After attending the graves of their departed, they settle into groups on the grass and engage in a weekly exchange of news and gossip.

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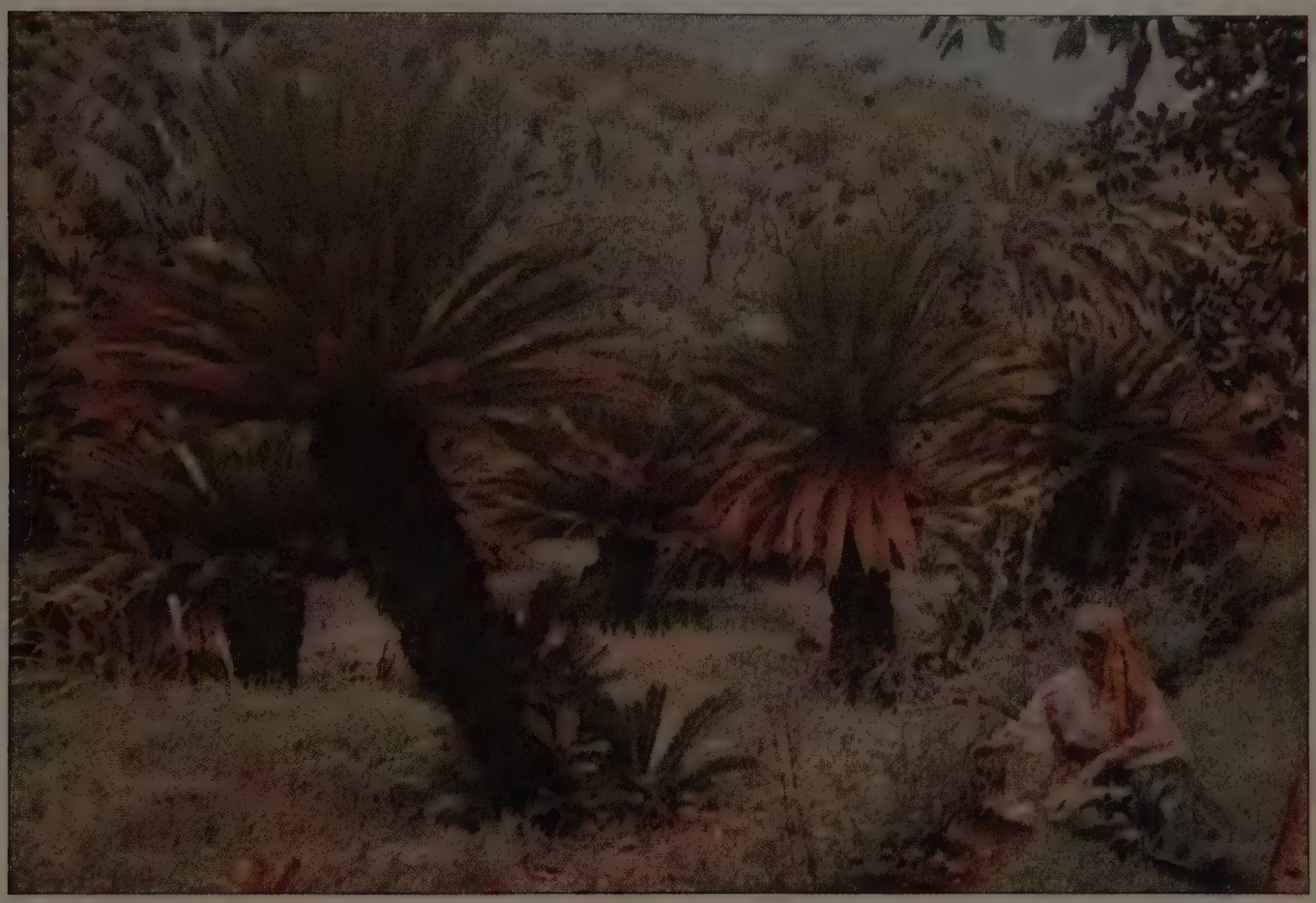
WHERE SONS OF THE PROPHET FIND THEIR LAST REST

Mohammedan burial grounds are accorded high respect, for Moslems reverence their dead. The Prophet decreed that the dead should be carried quickly to the grave, that a righteous person might the sooner arrive at happiness and a wicked one be sooner out of the way.



TREES THAT TRACE AN ANCIENT LINEAGE

The cycads are remnants of the floral life of the world that existed during the Carboniferous age. They are beautiful dark evergreens which, though long-lived, seldom grow as high as these. The French have made the Botanical Gardens of Algiers the finest in North Africa.

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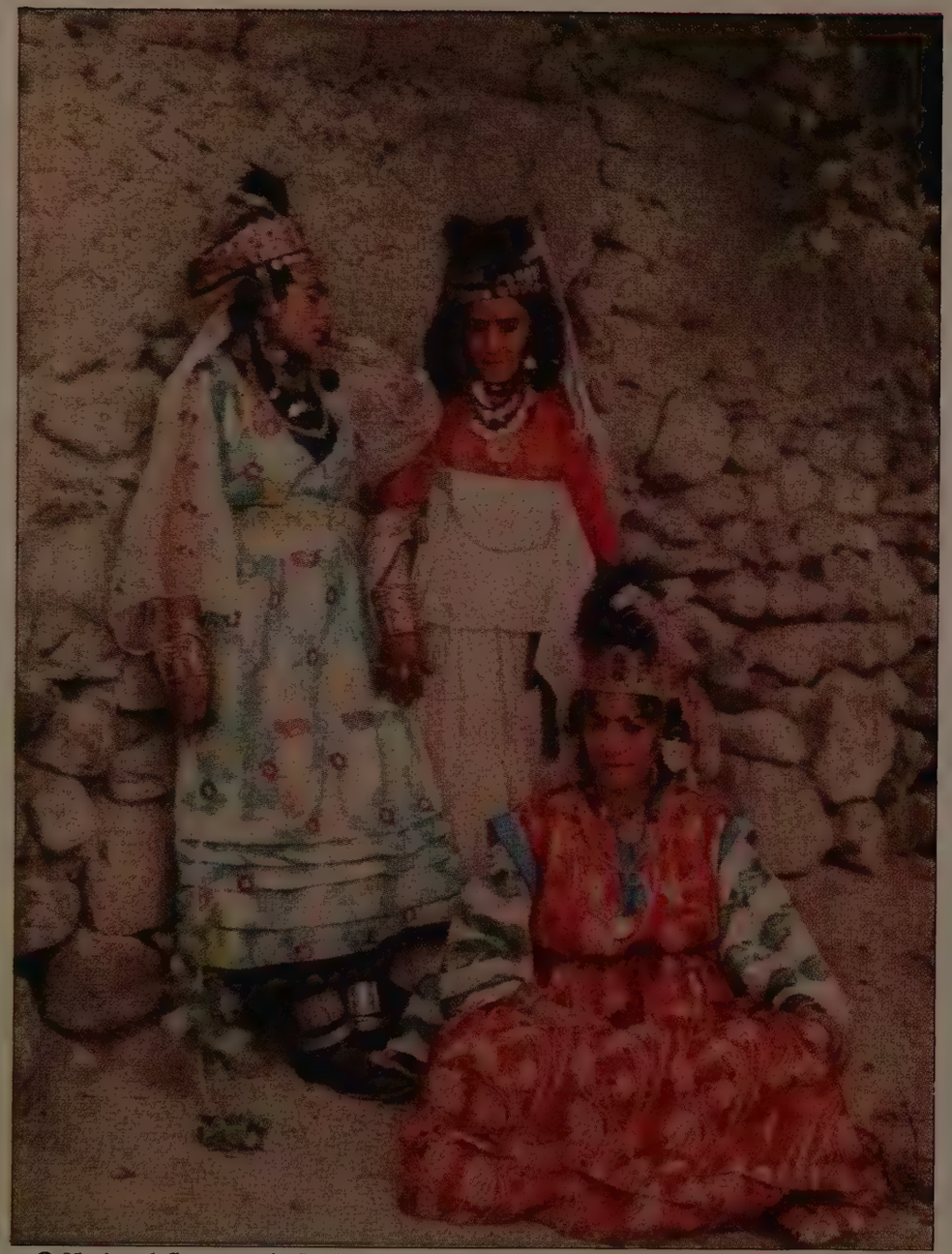
BAKERYMEN DISPLAY THEIR WARES IN BISKRA

Pure-food principles are not seriously regarded by the Arabs and many varieties of edibles are displayed on the street, with no protection from dust and dirt. A good Arab will not eat on the street, however, lest he give offense to some hungry person.



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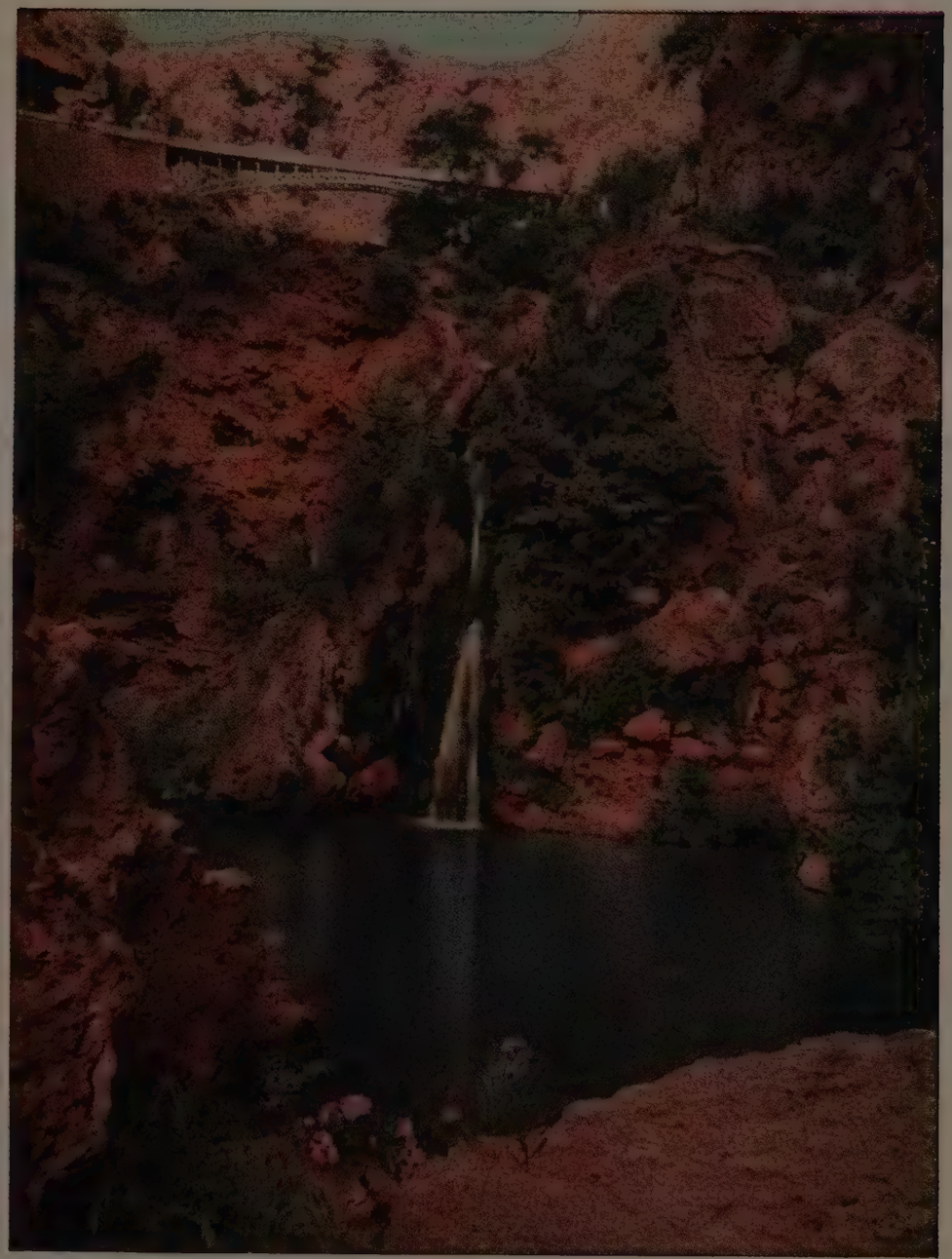
THEIR MILLINERY STYLES KNOW SLIGHT CHANGE

A headdress similar to this is supposed to have been worn by the women of North Africa in Punic times. The Ouled Naïls braid and plaster their black hair and then adorn it with gold and silver bands and ornaments that create an effect like stars shining in a desert night.



Autochromes by Gervais Courtellemont

BEAUTIFUL CASCADES ARE FOUND NEAR TLEMÇEN

Once a part of Morocco, Tlemçen presents a more truly Moorish aspect than any other city of Algeria. Situated near the sea at an elevation of about 3,000 feet, it has a delightful summer climate and is a health resort. It is also rich in historical and archeological interest

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A HEADDRESS WORN ONLY ON FESTIVE OCCASIONS

These caps are richly decorated with embroideries, often in gold or silver thread, and are generally worn with a similarly embroidered silk gown. On the streets Algerian women wear a "fall" veil over the face and a scarflike garment draped over the head and shoulders.

Autochromes by Gervais Courtellemont

A TIME-HONORED CUSTOM

Instead of knife, fork and spoon, the Arab diner usually uses his fingers, consequently the hands are laved both before and after the meal. Children attendants serve the guest with basin and water for the purpose. On the floor at the right is a brass coffee tray.

A MARABOUT BENEATH THE AGE-OLD OLIVE TREES AT BLIDA

The term "marabout" is applied to a Mohammedan holy man or saint and is also used to denote the tomb in which he is buried. These tombs are regarded as endowed with the holy man's sacred character and as such are hallowed places. Blida is a sizable city near Algiers.

© National Geographic Society Autochromes by Gervais Courtellemont

WHERE RICH MAN AND BEGGAR LIVE ALIKE

Among the Kabyles there are few fine houses, even the well-to-do living in primitive fashion. These Berbers have peculiar ideas of property, a man sometimes owning a fig tree but not the land on which it is grown and perhaps not even all of its branches.

DWELLERS IN THE "PLACE OF HAPPINESS"

Bou-Saâda is beautifully situated where desert and mountain meet. It is the nearest oasis of importance to the city of Algiers and is much visited by tourists. The name means "Place of Happiness."

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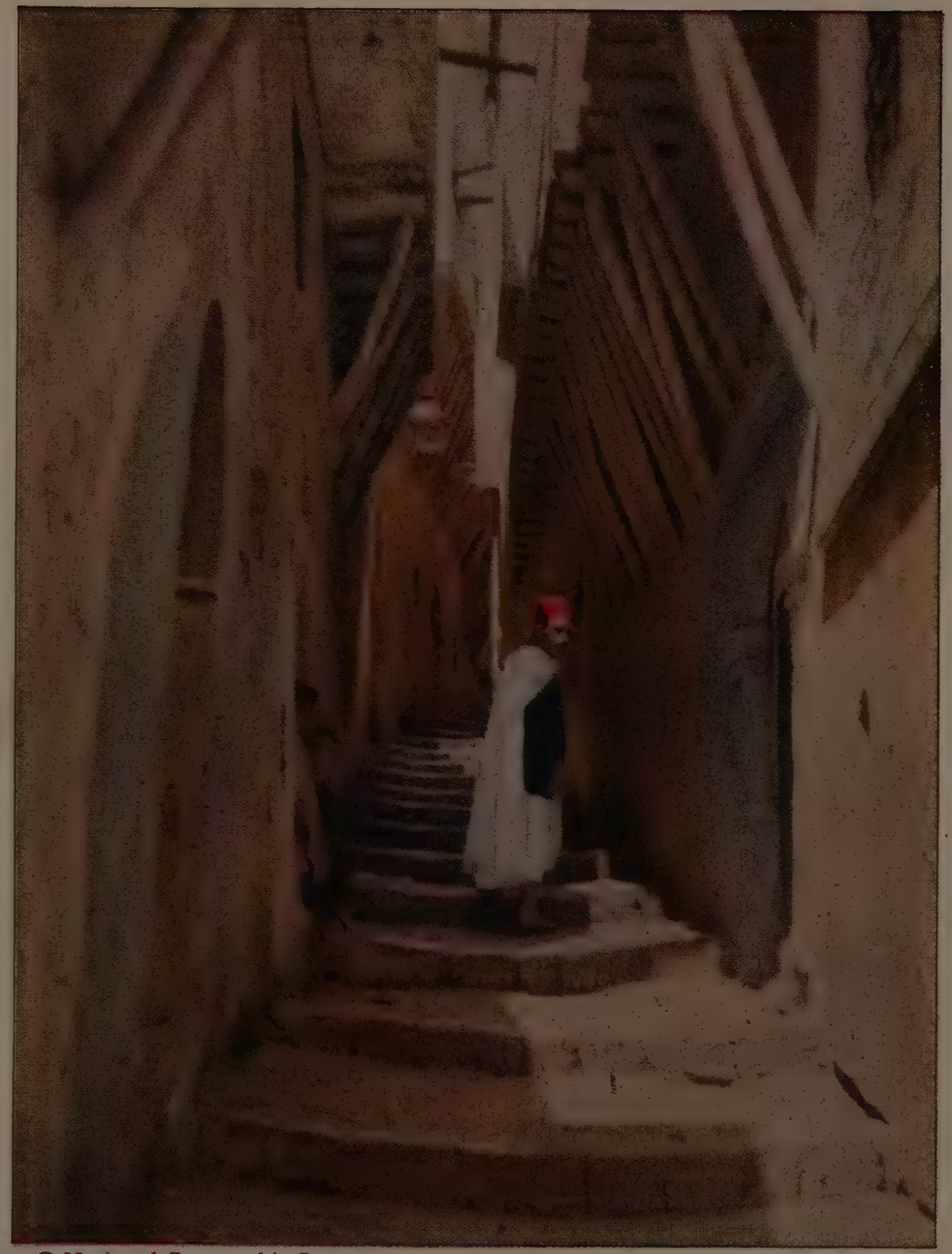
ALLAH'S GREAT GIFT TO THE DESERT DWELLER

In favored districts the date palm tree sometimes attains a height of 80 feet. In various parts of the desert country it is the only useful plant grown, and its sweet, nourishing fruit is literally the "staff of life" for many nomadic tribes.



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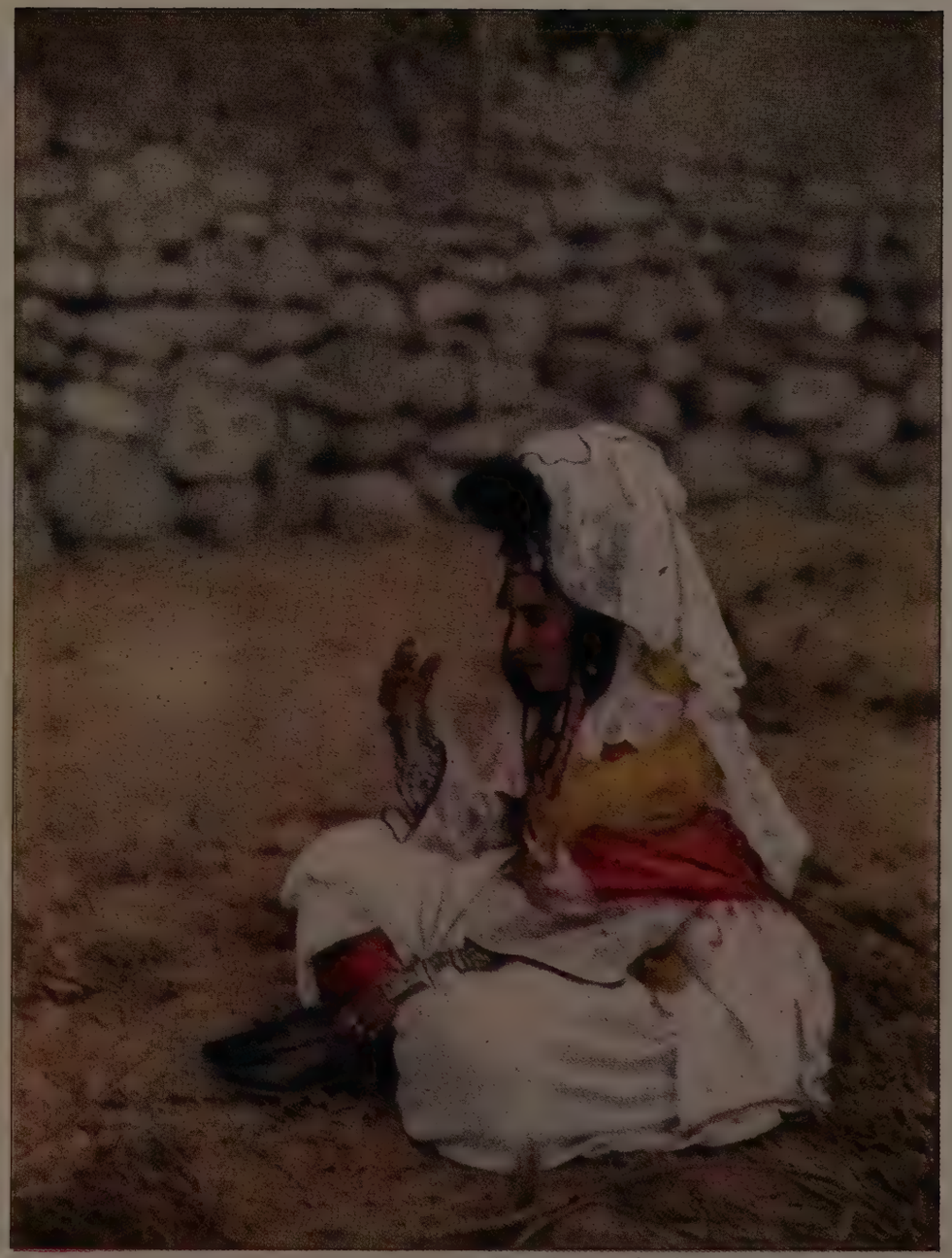
NO WHEELED VEHICLE EVER TRAVELED THIS THOROUGHFARE

The Arab quarter of Algiers presents a maze of steep, winding streets, some of which ascend so abruptly that they become a series of long, sloping steps. The houses that line them project outward on wooden struts until the upper stories nearly touch.



Autochromes by Gervais Courtellemont

A GAILY BEDECKED DAUGHTER OF THE DESERT

She wears the greater part of her fortune on her person. Silver and gold coins, cleverly linked together, and many artfully worked silver bracelets, necklaces, rings, anklets and headbands, some adorned with coral and turquoise, represent her earnings as a dancer.

© National Geographic Society

A HOUSEHOLD IN BISKRA

All is not beauty and romance in the country of sheiks and oases. Domestic arrangements are often extremely squalid.

Autochromes by Gervais Courtellemont

A QUARTET OF DANCING GIRLS

A pointing hand and a piece of red coral are worn by many Arab women to prevent the baneful machinations of demons.

BESIDE STILL WATERS

Wherever there is water the great desert blossoms into a beautiful garden. Here at Bou-Saâda a little river supplies the life-giving element. Numerous French artists have helped to make the beauties of this oasis known to the world.

© National Geographic Society Autochromes by Gervais Courtellemont

AN AFTERNOON "COFFEE" FOR LADIES ONLY

In Algeria, where neither tea nor tables are much used, coffee is the popular drink, and when the ladies gather in their courtyards for an exchange of neighborhood news the coffee tray is placed on the ground and they group themselves around it.

from sacked towns on European shores or weeping women from Italy, France, or Spain.

### MOORISH QUARTER UNCHANGED IN ASPECT SINCE PIRATE DAYS

In outward appearance this Moorish quarter has changed but little since those pirate days. Streets—alleys, rather—traverse it, steep and narrow—so steep that frequently they must become staircases to climb the hillside (see Color Plate XIV). Some are so narrow that three men cannot walk abreast, and the pedestrian must flatten himself against a wall to let a tiny, loaded donkey go by. Their very names are fascinating: Rues du Chameau, de la Girafe, des Abencérages, de Tombouctou, des Sarrasins. Has not Rue Lalahoum or Rue des Abdérames the Arabian Nights' touch? Has not Rue de Nuit a mysterious, and Rue des Dattes an attractive, sound?

The houses hemming the streets thrust out their upper stories, supported on inclined wooden struts, until they are not a yard apart. Often they are built completely across, so that the narrow lane must pass under them in a dark tunnel. The few windows, small square openings, are barred with gratings bent outward; and here and there a painted face looks out from them and smiles down invitingly on the wayfarer.

But usually the houses present a blank front to the outer world—blank, that is, but for a carved door with a small, twisted column on either side and a stone crescent above it.

One of these doors opens and three tiny children toddle out, laughing—one a boy in a red fez and a small shirt, the others little girls with flowered blouses, colored skirts, and gaudy handkerchiefs twisted around their heads.

The open door gives a glimpse of a wee tiled hall with a dwarf staircase twisting out of sight.

Farther down another door stands invitingly ajar. Pass through it out of the dim alley and you are in another world. A bright courtyard opens to the blue sky above. Two, three tiers of galleries with gaily tiled parapet walls top carved stone or marble pillars; a vine swings across the void; flowers in pots or Bougainvillæas dash notes of glowing color into the court on which women look down and call shrilly to the serving-maids seated on the paving stones below, cleaning great brass water jars of old and graceful design.

But the glory has departed; pasha and pirate have had their day, and their mansions, too, have fallen from their high estate. Instead of one rich man with his harem of silken-clad wives of many races peopling the chambers that open on to the tiled galleries and his wretched slaves filling the dark cellars and noisome dungeons below, a dozen or more poor families—Arabs, Jews, Maltese, Spaniards—now crowd into the one-time palace. Often the beautiful courtyards are turned to utilitarian purposes, and a carpenter's bench or a grocer's counter replaces the marble fountain that once sweetened the air with tinkle of falling water.

Out again into the dark lanes and vaulted tunnels. Stand aside and let this porter pass. Bent double, he lurches heavily up the steep ascent, a band around his forehead helping to support the weight of the immense burden on his back. With his red cap twisted about with a dirty kerchief, his torn shirt and baggy trousers, his bare feet thrust into heelless slippers, he resembles—and is like to him in feature as in faith—a *hamal,* or porter, of Constantinople toiling up the equally steep streets of Stamboul.

### PUBLIC BATHS ARE THE GOSSIP EXCHANGE

Out of a dark alley come two white-robed figures, veiled to the dark eyes that, lustrous and beautiful, shine under the black eyebrows and fair foreheads. Massive silver and gold necklaces hang on their bosoms, broad silver bracelets adorn their wrists, and heavy anklets surround the silk-stockinged ankles thrust into dainty slippers. Their henna-tipped fingers are loaded with rings.

With a lingering backward glance, these two enter slowly a carved marble portal leading into a hall walled and floored with flower-designed porcelain tiles. Inscriptions in French and Arabic tell us that this is the entrance to the Moorish baths, open to men until noon, to women in the afternoon. The fair ones flock to it, for it is their lounge, their club, their glimpse of social life, their Gossip Ex-

THE GATEWAY OF THE KASBA, THE SANGUINARY PALACE FORTRESS OF THE DEY OF ALGIERS

Once this pirate's lair was enriched with plunder exacted from the sea wolves of the Mediterranean by their tyrant chief (see text, page 206).

change—it and the Mohammedan cemeteries on Fridays.

### NOISY MARKET DEALS CONCLUDE PEACEABLY

The narrow alley dives into another tunneled passage under the houses and emerges on a wider space, a market. Spread out on the ground or on rough stalls are meat, fruit, vegetables, bread.

Arab and Negro dealers shout out their wares and prices in Arabic and in French, while tall men in white burnooses, shrouded Moorish women, and dark-haired, bare-headed Maltese girls chaffer and bargain excitedly. Buyer and seller shake their hands in each other's face, scream with rage, call on Allah or the God of the Christians to bear witness, then quiet down and conclude the deal peaceably.

At the corner of the market place is an Arab coffeehouse. Outside, squatting on the pavement or seated on benches against the wall, are Arabs, Kabyles, Negroes, men of all classes and ages — merchants, small shopkeepers, clerks, laborers—conversing volubly, playing cards, dominoes, draughts, or merely sitting—sitting idly, vacantly, unconscious of those around them. No man on earth—Neapolitan *lazzarone,* Hindu ascetic, or Buddhist priest seeking Nirvana—is capable of such utter detachment from the world as the ordinary Arab.

A few of those gathered in front of the café hold tiny cups of coffee in their hands, taste it, drink it slowly, savoring every precious drop of the pennyworth of fragrant dark fluid. Inside, at the tiled, waist-high fireplace, the cook dips a small, long-handled measure into the steaming copper pot resting on a handful of red embers and fills the cups for the bare-armed attendant to take to customers seated on benches or huddled on mats in the interior of the establishment.

The walls are scrawled with crude drawings of mosques, palm trees, tigers and elephants—these last by an artist who had evidently never seen either animal—or chromos of French presidents and European royalties.

A gray-haired, wild-looking man in rags, hung round with the skins of small

Photograph by Maynard Owen Williams

THE INNER HARBOR FROM THE BOULEVARD DE LA RÉPUBLIQUE (SEE, ALSO, PAGE 226)

All day long up and down this boulevard and the streets of the modern city passes the pageant of Algerine life in its color and picturesqueness of veiled, white-robed women and brown-faced men in flowing burnooses, of bronzed Zouaves in red-braided dark-blue jackets, baggy trousers and red fezzes, and scarcely darker Tirailleurs Indigènes in a similar uniform of a lovely turquoise-blue shade, of smart Chasseurs d'Afrique and scarlet-cloaked Spahis on their small white horses, of fat Jewesses and pretty French midinettes, of red-trousered officers and black-coated civilians.

animals; strums a one-stringed guitar made from the shell of a tortoise. He enters the café and, half shambling, half dancing, holding out a hand for money, wanders among the customers. As he moves he sings in a high-pitched, nasal voice, and the contrast between the Eastern love song and its singer is striking.

In better establishments, situated nearer the French quarter and patronized by well-to-do Arabs, one often finds a superior orchestra. Three or four black-coated, white-collared gentlemen in red fezzes play strange instruments—a big guitar, a large drum called a *teboul,* a long one, the *derbrouka,* similar to an Indian tom-tom; a *ghaïta,* a sort of flageolet shaped like a doctor's stethoscope, and perhaps a tambourine—the while they sing in nasal tones. The burnoosed or frock-coated customers, many of them educated in French schools, listen in appreciative silence to music that to the European ear sounds discordant.

To the poor native the café is a club, a hotel, a home. He brings his crust of

THE INNER HARBOR OF ALGIERS, BUILT IN A. D. 1518 BY CHRISTIAN SLAVES

The arcaded Moorish house, once the residence of the Turkish commander of the harbor, is now the French admiral's house. The polygonal bastion on which the lighthouse stands is all that remains of the Peñón. the fortress built by the Spaniards in 1510 to dominate Algiers.

© Lehnert and Landrock

AN ALGERIAN BEDOUIN TYPE

A SHREWD PRODUCT OF THE CITY STREETS

Photograph from Levasseur

AN ALGERIAN MUSICIAN

Clad in rags, but usually wearing a smile, these street minstrels wander from café to café, making weird sounds on their roughly fashioned guitars.

bread, his handful of onions, to eat there; he sleeps on its benches or on the pavement against its wall; and once or twice a day he spends two cents in it for a cup of coffee.

### TO THE ARAB THE CAFÉ IS CLUB, HOTEL, AND HOME

From the market place lead narrow streets and, as in such Eastern cities as Cairo, Tunis, Delhi, and Canton, each is lined with shops devoted to one trade. Down this one are the tailors. In the square holes devoid of counters, tables, or chairs, white-burnoosed, bearded men resembling Biblical patriarchs squat on the floor and sew furiously.

In the next street brass workers hammer at bright pots and tall water vessels, denting patterns into them with sharp-pointed instruments struck with mallets. Tinsmiths display piles of saucepans and coffeepots. In the tiny shops of the next crooked lane cobblers stitch rapidly at the native's easy red-leather slippers, or work beautiful designs with gold and silver thread and spangles on dainty shoes for women.

Here is a break in the trades-union character of the shops. Outside this one a small crowd eagerly watches the movements of a youth seated before a tiled stove running up into a pointed chimney. A small table stands beside him. In a dish he mixes a white batter, rolling it, pulling and twisting it with nimble fingers, then dipping it into oil and placing it in the stove. His hand dives in once or twice to turn the morsel.

Then with tongs he draws out a crisp, golden puff, places it on a small square of newspaper, thrusts it into an eager, outstretched palm, and receives a coin. The buyer turns away, contentedly munching the succulent titbit, and his place is taken by another expectant purchaser.

The next street blazes with color. Here black-bearded Mozabites in flowing Arab garb—heretical Moslems from the Mzab district in the Sahara—or hooked-nosed Jews in semi-European attire display a wealth of rainbow-hued, long-fringed silk shawls; gay-colored bodices and jackets; skirts and other garments in pink, blue, yellow, red; leather belts gold-buckled and

Photograph by Merl La Voy

A COBRA STRIKES AT A BALL

Snake charmers are numerous in market places and bazaars of Algiers.

heavy with bullion and gold embroidery; white wool or silk and wool *gandauras* (long gowns), and crimson burnooses worked with gold or silver.

Then comes the Street of the Jewelers! Many of the shops have glass windows displaying massive silver bracelets three or four inches wide, gold and silver earrings several inches in diameter, huge necklaces of broad, beautifully designed flat silver and gold ornaments, filigree rings, heavy anklets—truly a street of delight for womankind.

### THE "HAND OF FATIMA" BRINGS LUCK

And always there are innumerable tiny gold or gold-washed hands inset with coral or turquoise, the universal Arab mascot, known as the *Kamsa,* Five, because of the five fingers. Europeans term it "The Hand of Fatima," daughter of the Prophet. Every Arab woman—and many a foreigner—wear one, and on the wall of every Moorish house is its luck-bringing imprint. It is borne on the company colors of the regiments of *Tirailleurs Indigènes,* the Arab and Berber infantry skirmishers.

Dazzling white in the brilliant sunshine, the walls of a mosque almost blind one by their glare. But enter. You pass into dark, cool shadows, into a silent interior, bare and restful. Through the past centuries bearded Moslems with the blood of the Unbelievers red on their hands have gathered here to bow down toward Mecca and beg Allah's aid in fresh crimes. Yet they thought them meritorious deeds, by the truth of the Most High! And every Friday the Faithful come here still, and who shall say that none of them mutter curses in their beards upon the Christian dogs that rule them?

And the tall houses in the narrow lanes near the mosque harbor the Tribe of the Painted Daughters of Joy.

Of many nations are they: Arab women in gay kerchiefs, gaudy jackets of brocaded silk, and baggy trousers; Berber girls from the mountains of Kabylia, ar-

rayed in the colors of the rainbow; Ouled Naïls from the Ksar of Boghari, with necks encircled by chains of gold coins, their future marriage portion; stout, bright-eyed Jewesses from Oran and Constantine; Negresses from the desert oases, thick-lipped, fuzzy-haired, laughing, happy; and Christian women, too, alas!—French, Spanish, Italian.

From marble-pillared doors and grated windows the venal smiles are showered on the hesitating wanderers from many oceans.

At night this quarter is an island of light in the deep sea of darkness of the black alleys, where at long intervals an occasional, feebly glimmering lamp serves to make the gloom only more dreadful for the momentary relief. And the sound of barbaric music, the shrill voices, the high-pitched laughter of women, and sometimes an agonized shriek of tragedy, shiver the silence of the sleeping town.

THE OULED NAÏL GLITTERS WITH GOLD AND SILVER

From the open doorway of a Moorish café light streams out into the dark lane. Inside, a throng of seated Arabs in costly silk and woolen garments or in rags gazes eagerly toward the end of the long room, where, on a raised platform, a gaudily attired woman dances to the strains of weird instruments.

Her face is whitened and rouged, her lips carmined, her eyebrows blackened, her cheeks and chin adorned with spangles. In her ears are gold or silver earrings, hoops several inches in diameter; across her forehead and about her throat are bands of gold coins of many nations. Around her neck are necklaces of coins or beads from which immense ornaments dangle. Massive bracelets and anklets, some six inches broad, some hinged, studded with colored stones, adorn her bare arms and ankles. Her feet are naked and her toes, like her fingers, are stained with henna.

And her costume! No words can do it justice. Her head is swathed in a lovely, rainbow-hued, long-fringed silk shawl which streams down her back. In a corner of it her hair is tied, except for the plaits, with colored ribbons hanging down her cheeks.

Over an innermost gauze garment are two or three silk vests of palest pinks or greens or yellows, and above these a beautiful, rose-tinted brocaded silk jacket covered with transparent silver tissue and heavily embroidered with silver bullion. Her waist is swathed with a gold-tissued pink silk sash, and over it a gold-embroidered red leather belt. She wears wide trousers of pale blue silk hanging baggily over the slender ankles.

POETRY OF MOTION TO THE ARAB TASTE

Her dancing! She moves on her toes, but barely raises them from the platform. In her hands she holds a silk handkerchief behind her head or waves it occasionally in the air. But feet and hands, legs and arms, do not enter much into the dance; she performs chiefly with the muscles of her neck, breast, abdomen, and hips.

All her violent motions keep time with the strange music of pipe and flageolet and tom-tom, while five or six other dancers, as gaudily dressed, clap their hands or utter little cries at intervals.

An Arab musician—noseless, disfigured, hideous, a long cylindrical drum slung under his arm—springs up from his chair and dances wildly toward her, beating his instrument with fingers and palm as he hops in pursuit, while she glides past him and escapes with a lissome movement.

The eyes of the interested spectators sparkle as they gloat on the dancer's charms and movements. To them she is the poetry of motion, but to a European she is almost repugnant.

AN OPEN-AIR BARBER SHOP

The crowding houses of the city end. Across the road is a scarped hillside, with grass, gardens, and trees. In a small open space native barbers shave the scalps of clients or squat beside their chairs waiting for trade, while their tools—razors, scissors, clippers, mirrors—are laid out ready on the ground.

This open-air toilet saloon is a strange sight for the tourist, but does not gain a look from the passengers in the electric trams passing within a few yards of it.

Suddenly one come upon tombs and the ground falls sharply away. The eye ranges over the deep valley of Bab-el-Oued, with its gardens and houses, to the

© Elmendorf, from Galloway

A STAIRWAY MARKET

The lack of level spaces does not deter the Algerian trader. He pitches an awning on the stairway streets and displays his "business as usual" sign before it. These stands are near the fish market of Algiers.

bright-red scars of quarries and cliffs in the green hillside opposite, crowned with the domes of the famous church of Notre Dame d'Afrique. It faces across the Mediterranean to its sister, Notre Dame de la Garde, on the height above the harbor of Marseille.

Here, where one stands on the summit above the steeply descending pathway, are the densely crowded graves of the Arab cemetery of El-Kettar. A very few are marked with white domes. Most of them have thin white stones at head and foot; some are but green mounds. A gravedigger in a garment of ragged sacking and a wide-brimmed straw hat is digging languidly, while a couple of urchins stare with interest at brown bones and a skull in the mold that he has thrown up.

Across the drawbridge a small procession of natives in red fezzes and coats and trousers follows toward the cemetery a man in a worn burnoose. He carries in his arms a tiny packet wrapped in white cloth and covered with a gold-fringed, parti-colored silken pall. Beside an open grave he stops, pulls off the cloth, and lays his burden tenderly on the ground. He raises his hands to his head in prayer, while his friends seat themselves on adjoining mounds, light cigarettes, and gossip unconcernedly.

The gravedigger joins the party. The sorrowing father lifts up the tiny body of

Photograph by Merl La Voy

ORANGE PEDDLERS IN THE NATIVE QUARTER OF ALGIERS

Fruit dealers have no stands or stalls, but simply spread a cloth on the ground, arrange their offerings, and rest until customers arrive.

his son—it must be a boy, for a girl would be treated with scant ceremony—and lays it gently in the shallow grave. While the earth is being thrown in, he sits with hands stretched out, palms uppermost, and chants in a high-pitched tone, while his friends, seated or standing, some smoking, but all with similarly outstretched hands, interject responses.

In a few minutes the simple funeral is over. The friends go off chatting gaily, while the father, the gold-fringed pall over his arm, accompanies the sexton to pay for the little grave.

### THE KASBA, HOME OF PIRATE LORDS

On this sad Garden of Allah the walls of the Kasba look down. In this palace, fortress, prison the last Deys of Algiers shut themselves away from their discontented subjects and the guns of their stronghold frowned threateningly on the murmuring city beneath. Here the Pirate Lords, surrounded by soldiers and slaves, lived out their days in debauchery and cruel tyranny. In 1830, however, the last of them, Hussein Pasha, saw from his windows France's avenging squadron maneuvering in the bay below and her brave soldiers swarming up the wooded slopes of El-Biar above. His rule of rapine was at an end.

But the taking of the city of Algiers was only the prelude to the long-drawn-out conquest of Algeria. Wars, rebellions, the hesitation of politicians, delayed it. Only after the Franco-Prussian struggle of 1870-71 did a government in Paris decide that the country must forever remain under the Tricolor.

At the cost of much blood and treasure the task was achieved; and, just as the pirate city became the beautiful Algiers of to-day, so a land sunk in barbarism, cruelty, and lawlessness developed into a Department of France, rich, fertile, and prosperous.

To-day, from the walls of the Kasba, one looks down on a larger, grander city than Algerine pasha ever knew, on a splendid harbor where a great fleet may ride at anchor.

The White City of Algiers lies between blue sea and green hill, like a pearl set among sapphires and emeralds in the Crown of France.

# THE WARFARE OF THE JUNGLE FOLK

## Campaigning Against Tigers, Elephants, and Other Wild Animals in Northern Siam

By Merian C. Cooper; Photographs by Ernest B. Schoedsack

*Co-authors of "Grass" and "Chang"*

TIGERS growling, elephants trumpeting; the panther scream and hyena brawl—all under the big, hot, stuffy tent on a summer's day, with that strange, unforgettable smell of the menagerie. In the runway before the cage bars, a surly keeper with his mop and bucket—and a printed warning not to feed or annoy the animals!

That is as close as most of us ever get to the man-killing creatures of the jungle.

Yet who has not dreamed, especially in youth, of some day plunging far into dense tropical forests, heavy rifle in hand, followed by faithful but frightened naked native gun-bearers, there to pit one's courage and skill against savage jungle beasts!

Most of us, alas, must ever dream and keep right on selling real estate or motor cars, pulling teeth or practicing law. All we really know of dangerous wild beasts, of how they live, fight, kill their prey and are trapped by wily jungle folk is what we read in books, or see in "movies."

The stench of menagerie, the glimpse of weary, moth-eaten beasts in park pens, or in steam-heated cages at the zoo, keep the imagination of childhood ever active. But, upon the free, natural life of wild beasts in the forest primeval, civilization closes the door.

### THE TIGER DOMINATES THE LIVES OF THE LAOS

Yet to me, happily, came the realization of a lifelong dream. With Ernest B. Schoedsack I spent a year in the far jungles of Siam, observing, trapping, and picturing wild animals—shooting them only when necessary, to save my life or that of my companions.

It was essential to our job of making a sort of folklore picture tale of the Laos of the Nan district in the north that we should learn as much as possible of their attitude toward the jungle and its beasts.

The longer we worked among these people the more evident it became to us that they did not think of the jungle simply as an enormous growth of trees, bamboo, and underbrush; but thought of it, rather, as some huge personified force; likewise, they did not think of the jungle animals as only wild beasts, but thought of them also as beings with definite thoughts and personalities.

Up in the Lao country around Nan this attitude of the native was particularly strong toward the tiger. The tiger at times almost dominates the thoughts and lives of the people. This beast is the power, the dread, the blood-lusty personification of the cruelty of the mighty jungle itself, of this jungle which surrounds the native villages and which, to their untutored eyes, seems to sweep on into infinity.

I have been in villages where the people scarcely dared speak the name *suar* (tiger) because of their superstitious fear that the devil-spirit which rides on the tiger's back might mysteriously hear them and, resenting it, take revenge.

There is a basic reason for this fear: the tigers of the Nan district have a frightful reputation as man-killers, and it is a well-deserved one.

I have been in jungle districts in south Siam (and I am told that in parts of Indo-China and India there is the same feeling) where the tiger is looked upon in an almost friendly spirit, and where only in rare instances are the village folk harmed by him. But this is not the case in the Nan district; there the tiger is feared as the cunning devil and man-killer that he is.

### THE NORMAL TIGER IS AFRAID OF MAN

The longer we lived in Nan the more interested we became to find out why the tigers of this district killed human beings so easily and so frequently, and why tigers

MAKING SKYROCKETS WITH WHICH TO PRAY

These natives of northern Siam are pouring powder into joints of bamboo which they will shoot off in religious ceremonies (see illustration on opposite page).

of other districts did not. For many months a good part of my time, energy, and thought was concentrated on the trapping and handling of tigers, and though, as a rule, I was unsuccessful, I nevertheless gradually learned more and more of the ways of the great cat, until, at last, certain convictions, rightly or wrongly, became implanted in my mind.

The first and foremost of these is that no tiger is naturally a man-killer. The normal tiger has an instinctive fear of man. This normal tiger is a game-killer. Deer, wild pig, and the like are his natural prey and food.

But where man invades the jungle in numbers, one finds a second class of tiger. The spread of the rice fields and man's own hunting thin out the game, and it becomes increasingly difficult for a tiger to kill his normal food. Also, he sees another kind of food always near at hand, in the villagers' cattle.

Thus the tiger becomes a cattle-killer, living either entirely on cattle or supplementing his game diet with such an occasional kill. In some districts the natives submit almost tamely to this killing of their cattle by the tiger, as if it were a weekly tax paid to the "King."

The third class of tiger is the man-killer. My belief at first was that the only man-killers were those individuals which, because of injury or old age, had become too slow easily to catch game and too weak easily to kill the villagers' buffalo, and which, therefore, in hunger and desperation, had attacked man. Then, discovering how easy it was to kill a human being—how slow, how feeble, how soft a creature he is—they had turned to man-killing as a regular practice.

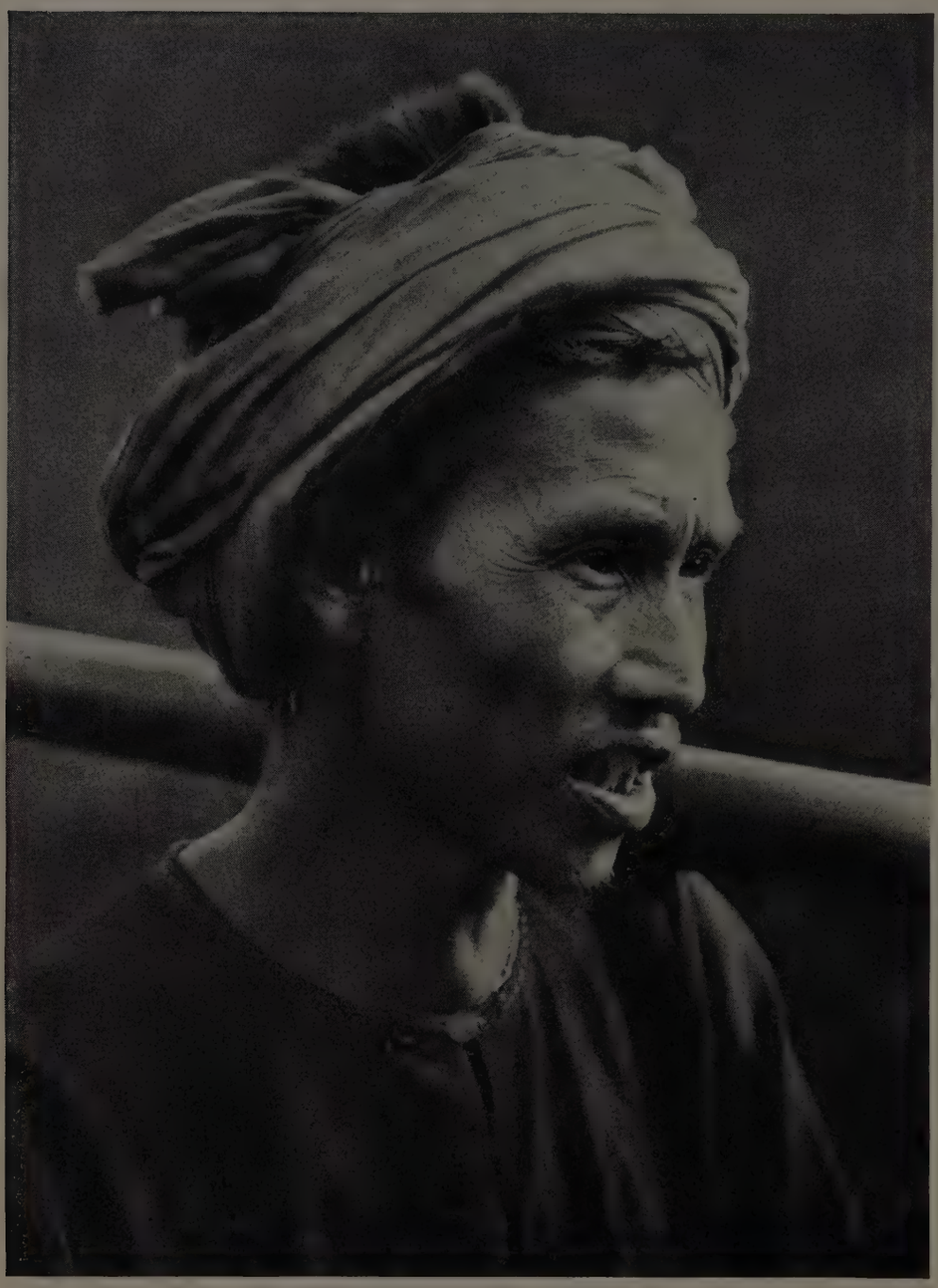
### TIGERS TAUGHT MAN-KILLING AS CUBS

After a time, however, it seemed to me impossible that this theory could be entirely true in the Nan district (though I still think this the main reason for tiger man-killers); there could not be enough injured and old tigers.

I realized that one man-eater alone could do an immense amount of killing; patrolling a wide area; killing at one vil-

PROPITIATING EVIL SPIRITS

A lofty platform has been erected from which a crude skyrocket (see illustration on preceding page) is to be fired as part of a religious rite. The Laos are a brave people when dealing with material dangers, but they dread the *pees,* or spirits of the dead, and this is one of the methods employed in buying off or scaring away the evil ones.



A MAN OF THE MOUNTAINS

The Laos, who are numerous in Siam, particularly in the highlands of the north, are not unlike the Filipinos in complexion and physique. They are essentially agriculturists and have few industries. Their women are in no sense mere drudges, but occupy a high and respected place in the home.

lage one night; appearing like a phantom some days later at a second village many jungle miles away, to kill again.

Nevertheless, man-killing seemed too prevalent in Nan to be the work of but one or two tigers, for the records show several hundred people to have been killed and eaten by tigers near Nan in the past few years. I obtained these figures both from the governor and from Dr. Hugh Taylor, a man of impeccable honesty, the eldest of the four American missionaries who were the only whites in the Nan district.

Also, in my small expeditions through the jungle, I found scarcely a village near Nan which had not lost in the previous year from one to four people, and in some villages the number was greater than this.

I was at last driven to the conclusion that some of these man-killing tigers were probably full-grown, fit, uninjured, and not too old, and I became convinced that the reason for this was that some injured female had taught her cubs man-killing; that these cubs when grown had followed the habit and possibly had passed the nice tradition on to their children.

### TRAPPING THE MAN-EATERS

We tried our hand at trapping these man-eaters. We had a staff of our own native trappers, and conscripted the villagers wherever we traveled. We were almost constantly defeated, partly because of the cunning of the tigers themselves, but quite as much by the superstitions and fears of the natives.

Their dread of the tiger is easily understood. It was one thing for me to go trekking through the bush, armed with a modern rifle, followed by five or six carriers, making a party so large that it would be a brave or hungry killer indeed who would attack unprovoked; it was another thing for a native to live in the heart of the jungle, in a frail bamboo hut, where, half-naked, sometimes alone, armed with only his knife of soft iron, he must one day meet the catlike spring of an enormous beast, terrible in its strength, quickness, and destructive power.

No one who has seen only the zoo tiger

can have any conception of the beauty, strength, and energy of the full-grown male of the wilds. Its great muscled shoulders, gorgeous coat, huge white teeth, its swiftness in exploding into action — all animated by the cruel spirit reflected in the glare from its blazing eyes— give it the semblance of the God-Devil which so many of the natives believe it to be. Almost any one living the life of a Nan villager would feel as he does about the tiger.

Yet our appreciation of the natives' fears did little to soften our chagrin when twice in far villages the natives killed tigers in our traps before we could get there to bring them in alive, so great was their dread. And more than once we cursed native carelessness and folly when tigers escaped from traps built by our native assistants because the villagers feared to go near and block the animals in securely after they had been trapped.

CHILDREN OF NAN

And how often, too, we raced along some jungle trail on horseback or on foot, or went up the river by boat, stirred by the news that a tiger had been caught— "head as big as a barrel, as tall as a horse, O Ni"—only to find the trap's real occupant was a snarling leopard!

### TIGER LORE OF THE NATIVES

Yet, despite many failures and despite the final ludicrous means which we adopted to finish the tiger sequence of our picture tale, I became more and more interested in tiger lore—intent to listen to tigers calling in the night, to know of the tiger's hatred for crows, which so often loudly warn the weaker ground animals of the coming of the jungle killer; to know that the villagers believed a tiger which scratches the ground (and we found many such marks) is strong and brave; to know that every notch at the back of a tiger's ear is believed by the natives to be a sign of a man killed; that a tiger is supposed to kill a man by holding it in the embrace of his forepaws, claws sunk deep in, thereby breaking the man's neck, and by sinking his teeth into head or chest; that a tiger follows regular paths, like jungle "streets" to him; that, unlike most cats, he is a good swimmer and likes water; that tigers in the foothills move in regular seasonal migrations.

The natives believe that in dry weather the tigers go to the hills, where, the jungle

SECOND-STORY BUNGALOWS ARE THE MODE IN SIAM

In the jungle villages the houses are raised high, on stiltlike supports, to afford the occupants protection from prowling wild beasts. In the vicinity of Bangkok and other river towns they are similarly raised to escape high tides and floods (see page 264). The homes of the poorer classes are usually made of bamboo and woven thatch.

being then thin, they can easily catch the game, which also has moved up from the sun-beaten valleys because of the drying up of the foliage there. They believe, too, that the tigers become fat and happy in the hills, but that in the wet seasons they grow thin and dangerous, and descend to the valleys, where the villagers suffer from their depredations.

### "A TIGER WILL NOT KILL A CAT"

A hundred facts and superstitions, mixed and stirred together in native thought, were happily sought after and considered by me at night after long days of work in the blazing sun. It was good then to have as a substitute for books the recalling of some question and answer, like:

"Will a tiger kill a cat?"

"No, Ni, the cat is the tiger's teacher; and will a pupil kill its teacher?"

Or, to recall a conversation with a stubborn village chief who did not like to keep our traps baited:

"Why will you not put a dog or a pig in the trap?"

"It is useless, Ni. The tiger likes only men."

"Well, then, why not put a woman in the trap as bait? You can spare an old one, no doubt?"

"Yes, Ni; we can spare many old, scrawny ones, but the tiger likes fat,

BANGKOK, "VENICE OF THE EAST," HAS HER OWN TYPE OF GONDOLA

These teeming small craft are usually propelled by a single oar, the boatman standing or sitting in the stern. Paper umbrellas are useful in warding off the fierce rays of the tropical sun.

pretty young girls, just like you and me."

Not, indeed, that a Lao would ever bait a trap with an old woman; but he, too, has his sense of humor.

### A TIGER TRAP BAITED WITH A PICTURE

The crowning stupidity, however, was witnessed by a young man named Brockmann, who went out on a short trip for the purpose of building and inspecting traps for us. He found one village with a fine large trap, but no bait. In answer to his indignant questioning as to why the trap had not been baited, he received this reply:

"Ni, here the tiger will eat only man. So we got a big colored picture of a man and put it in the trap each night for many nights. But the tiger never came after the man's picture, so we knew it was useless to bait the trap with only a dog or a pig."

And, indeed, Brockmann discovered that they had actually propped up in the trap some cheap print of a man for tiger bait!

It was often discouraging to come back after a trek through the jungle and again hear stories of a tiger that had killed men within the precincts of Nan town itself; of the two tigers which Dr. Taylor had killed some years before in broad daylight, within a hundred yards of our compound; of the killing of the brother of our cook by a tiger, just a few days before Schoedsack's arrival in Nan; of how a man had been killed quite near one of our traps, and then of how the villagers had thrust

TWIN DRAGONS FORM THE WALLS OF THIS BUDDHIST WAT (SEE, ALSO, PAGE 243)

The monasteries of Siam are built within an oblong space surrounded by a brick wall. Often the wall is quite high and the cells of the monks are built against its inner side. The tiles on the roofs of these cells constitute the scales of the great dragons. Within the monasteries the "Brethren of the Yellow Robe" pass their peaceful lives, subsisting on the bounty of the people and meditating.

the half-eaten body into the trap for bait, and of how, finally, the tiger had pawed the body out of the trap and escaped.

Stories galore of "tiger, tiger, tiger." But where were the tigers in our traps?

Our traps dotted the country. They were all basically of the same type—a sort of glorified rat trap, built of heavy logs, with the entrance through a low door at the front. A dog or a pig would be fastened inside a separate little cage, inside and at the rear of the trap. The tiger was supposed to enter to get at it; then, inside, to step on a treadle. This dropped the door, thus trapping the tiger. Only, we caught no tigers (see page 245).

We camouflaged our traps; we soaked them with chicken blood to kill the man smell; we tried all manner of bait—and, not a tiger! Leopards, yes, plenty of them; no trouble about catching leopards; but not a tiger.

### "TIGER, TIGER TRAPPED AT LAST!"

But one day, when Schoedsack and I came back across the river, we found our "boys" tremendously excited. *"Suar! Suar!* Tiger! Tiger!" they cried. A tiger had been caught in a trap in a village far up the river.

While Schoedsack prepared the boats and cage to send up the river, Dr. Douglas Collier, the medical missionary at Nan, a courageous, keen young man; Kru Muang, a wiry, slim young Lao, who acted as our guide, interpreter and counselor, and I rode off on horseback

THE NORTHERN SIAMESE WOMAN OPERATES THIS PRIMITIVE RICE-HUSKING MILL WITH HER FEET

Each Lao family has its own mill, which consists of a large wooden mortar set into the ground and a log pestle which is lifted by a lever pushed by a woman's foot. The pounded rice is the chief food for the family and also furnishes a bran which is cooked with certain weeds to make a special delicacy for the pigs.

THE WAT IS THE CENTER OF SIAMESE RELIGIOUS LIFE

A youth's education is not considered complete or his preparation for manhood sufficient until he has entered a monastery attached to a temple and worn the yellow robe of a Buddhist monk for at least a month or two. Unlike the usage in most other lands, in Siam a monk may be released from his vows and return to the lay world whenever he desires.

to cut across country in order to make the village that night.

Soon after we plunged into the jungle, riding along a rough, narrow trail, black night settled down upon us. Then the moon came up and now and then lighted our way.

Finally we came to a village. Everyone was excited. The natives had heard of the trapped tiger on ahead.

Between the tiger and us the way was very rough for night riding, but Collier voted to go on; so, with torchbearers in front and torchbearers behind us, we plunged ahead.

After following the river bank for an hour, we swung around a turn in the trail and approached another tiny village. We rode through it and came upon as weird a sight as I have even seen. Around great glowing fires sat and stood groups of half-naked, wild-looking fellows. The red-and-orange light played on their spears and swords, on their brown bodies, on their tousled shocks of black hair, and threw its eerie radiance on some huge black shape in the center of all.

We swung off our horses and drew near. We saw that this great irregular shape was, in fact, the trap; but now it was piled high with logs, which had been lashed again and again with native rattans, so as to double and redouble and double again its strength.

We stepped close to the trap, stooped and tried to peer between the logs. Then from the midst of it came a deep and coughing roar. It was the tiger, trapped at last!

"IT IS MR. CROOKED"

We threw our blankets on the ground near a fire and soon Muang came to us. "It is Mr. Crooked," he said, grinning broadly.

HE GUARDS THE RICE FIELDS OF NAN

The natives hold that the evil spirits must fear this dragon, since the fields he guards are among the most fertile in all Nan (see, also, page 240).

"Mr. Crooked!" That was a name well known in that little jungle world. Mr. Crooked was one of the famous man-eaters of the district, his crimes and his trail famed and unmistakable, for one forepaw turned in, and the mark of that crooked foot was often seen where some hapless native had been killed and eaten.

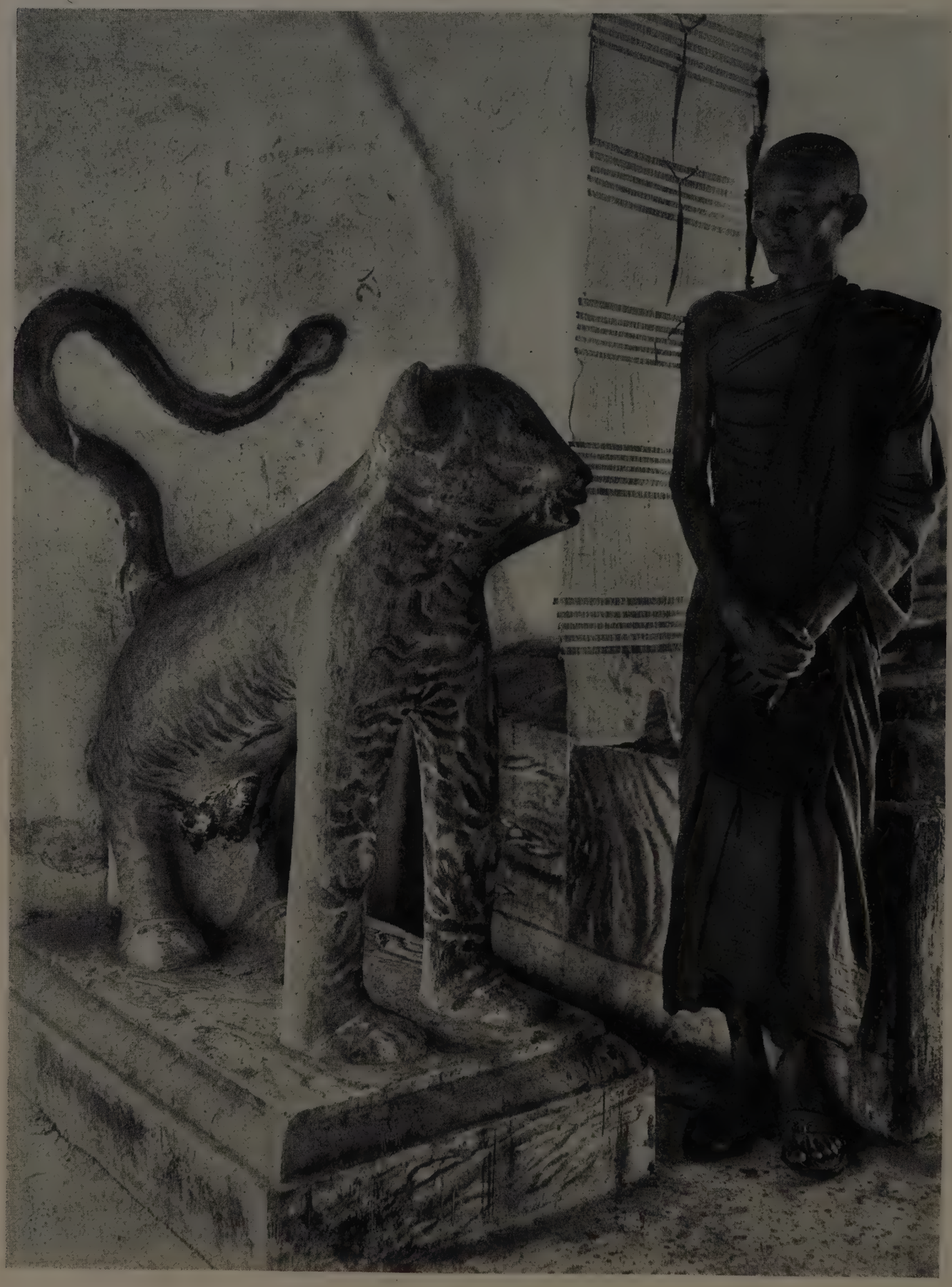
Next day the cage arrived, having been brought up the river. But the villagers laughed at it and said it would not hold a big rabbit. Indeed, it *was* too weak. But we strengthened it with a solid lining of small logs; then jammed its door against the door of the trap and lashed cage and trap together.

It was our purpose to open both doors and transfer the tiger from the trap to the cage. The villagers, however, put little trust in this arrangement, and when we were ready to open the doors the only village men near us were well up high trees.

### TRANSFERRING THE TIGER FROM TRAP TO CAGE

Collier stood at one side of the doors, I at the other, guns ready. Muang and Tahn stood on top of cage and trap, respectively. At a word they lifted the two doors.

We waited, tense. Nothing happened. We waited longer. Still nothing happened. Finally, I put down my gun, picked up a lighted torch and thrust it into the back of the trap. At that, the tiger leaped forward the length of the trap and straight through into the cage.



A DEMON BECOMES A DEITY

Although nominally followers of Buddha, the Laos of Siam are primarily spirit worshipers. Because of its great strength, imposing appearance, and the sinister influence it exerts on their daily life, the tiger is supposed to possess a spirit and in some instances is worshiped on this account.

PREPARING A SURPRISE FOR THE LORD OF THE JUNGLE

Tiger traps are made of stout logs driven into the ground and lashed together. A dog, goat, or pig is placed inside in a smaller inclosure as a bait (see text, page 240). The tiger steps on a treadle as he enters the trap, thereby releasing a drop door and making himself a prisoner.

Down came the doors. Mr. Crooked was caged.

It was night when, by torchlight, we bore the cage down to the river, swung on poles resting on the shoulders of as many men as could catch hold. They lowered the cage into the center of one of the boats. It just squeezed in, for these boats are but long canoes, hollowed out of big trees.

We shouted to the villagers to catch us another tiger and started off.

It was pleasant now; our boys had brought little camp chairs for us, and Collier and I were ridiculously luxurious and happy, sitting there with Mr. Crooked safe behind us in his strengthened cage, as the current and boatmen swung us swiftly along.

### MR. CROOKED STRIKES A BLOW FOR FREEDOM

Then the wind rose, rain came sweeping across us, thunder and lightning. A proper

MATCHING THE TIGER'S OWN CRUELTY

The deadfall is the most terrible of all weapons used by the natives against jungle animals. It is made of heavy logs into which are thrust scores of sharp bamboo stakes. When tiger or leopard goes under the deadfall for the bait, a support is released and the heavy logs descend and impale the prowler.

JUNGLE ROYALTY ROARS DISAPPROVAL

Ferocious by nature and possessed of enormous strength and agility, the tiger is universally feared in Siam. Wherever Europeans and their high-powered, accurate rifles have not penetrated, this formidable beast holds its own.

RARE MARKSMANSHIP IS REQUIRED IN SHOOTING BIRDS WITH A CROSSBOW

The Laos conserve their limited supply of powder and shot for use against the striped and spotted prowlers of the night.

tropical storm! We were soon soaked through; but what difference did it make, we thought, for had we not a tiger?

Then, as I tipped my chair back against the cage I heard a sound of ripping and gnawing. I jumped up and swung out on one of the bamboo outriggers which we had lashed to each side of the boat, to steady it against the top-heavy weight of the cage.

No sooner was I on the outrigger than I was yelling for Muang and Collier, and with good reason; for through the beginnings of a goodly hole in the cage I was looking right into the tiger's eyes. Mr. Crooked had, during the noise of the storm, gnawed away a log of the inner cage and seemed in a fair way to get out.

Happily, we had brought aboard plenty of extra logs and small, thick bamboos, and we managed to lash some of these over the hole he had made. Again Mr. Crooked tore them loose, and again we fastened them.

Then, of a sudden, the boat stopped with a jerk and a jar. But for the outriggers, it would have overturned. Everyone, including the boatmen, had been far more interested in what was happening to the tiger than in anything else; so, in the blinding storm, the boat-canoe had run aground on a sand bank near the center of the river.

We were over the side in a minute, and it was not long before we had righted the boat and got her off. But Mr. Crooked had taken advantage of his opportunity and had broken loose more of the logs than before.

### ADMINISTERING A DOSE OF CHLOROFORM

Of course, we could have shot the tiger without danger to ourselves at any time, and we were never in real danger of any kind during the entire episode; but we were desperately anxious to bring Mr. Crooked in alive.

It was here that Collier saved the day.

STRIPED FURY PERSONIFIED

Many tigers of northern Siam are man-eaters and the villagers live in constant dread of their depredations. Once having overcome their instinctive fear of man, they become very bold, often going into the villages to seize their prey. The Laos are no match for these beasts, and of all jungle creatures only the elephant, and on occasion the buffalo, can make a stand against them.

He had brought a big bottle of chloroform with him, despite my joking about it. Muang hacked the partitions out of one of the small bamboos, thus making of it a hollow tube. I thrust the bamboo through the bars right into the tiger's mouth, and Collier instantly poured a lot of chloroform down through the improvised tube.

It didn't put the tiger out, but after we had repeated the dose a couple of times it sort of discouraged him. Indeed, it discouraged him long enough to give us time to repair the cage. And when he recovered and tore a log or two loose again, we repeated the performance.

Finally, the chloroform was exhausted; but in using it we had learned a lesson—the tiger would always haul our bamboo sticks into the cage and destroy them completely, with great grunting, chewing, and gnawing, before renewing his attack on the cage.

Finally, the storm ceased, changed to a soft drizzle; then the dawn came slowly up, and with the dawn the tiger gradually stopped its raging, at last becoming quiet.

Muang slept, Collier slept. I was three-quarters asleep on my feet. Then I climbed on top of the cage and lay down there. As I rested I listened to Mr. Crooked's breathing and hoped he was as tired as I.

### MR. CROOKED'S WHISKERS BECAME GOOD-LUCK CHARMS

We came around a turn in the river. The coconut trees, bamboo groves, and little thatched houses of Nan came in sight. People rushed down the river bank, shouted at us, and our men proudly shouted back, "Tiger! Tiger!" Softly we ran alongside of the bank. We had brought Mr. Crooked home.

Mr. Crooked, after demise, was discov-

INSTEAD OF A SCARECROW THE LAOS USE A SCARE-SPOOK

The woods and streams of northern Siam are supposed to be peopled with spirits, to many of whom are attributed malicious practices, and some such powerful charm as this must be placed in the rice fields to protect the crop.

ered to be a lady—a medium-sized female. She had once been shot in the leg. A ball from an old native muzzle-loader had struck her; we found the round piece of lead just under the skin. This undoubtedly had caused the injury which made her toe in and gained for her the famous title of "Mr. Crooked." At the last her bones were bought by Chinese to make "powerful medicine," and her whiskers became charms against ill luck, the finest in all Nan.

### A DOZEN LEOPARDS CAUGHT

Though tigers for a long while took up much of our attention and thought, we were in reality spending much more time in handling other animals: leopards—cunning, treacherous, slim, daring, brave, and viciously cruel—we caught over a dozen of them. Much bolder than the average tiger, they ventured even into the villages, seeking dogs, chickens, and sometimes children.

Pythons, wildcats, mongooses, bears, anteaters, monitor lizards, sloths, and a variety of other small animals were caught either by our own men or the villagers. Of these little beings of the wild, the ones which interested us most were the gibbons—tree apes of white, black, or brown.

Capable of running upright among the branches or along the ground, balancing with their long arms outspread, performing miracles of acrobatics, they proved of immense interest. We had sometimes with us as many as a dozen of them.

They are the most delightful of pets (see pages 252 and 255). The white and the brown ones usually become very affectionate, though with an antipathy, as a rule, for children; the black ones are more fierce and difficult to tame, yet some of these as well could be made into delightful friends. A half dozen other types of monkeys were also brought to us.

### NO MAN MAY KILL AN ELEPHANT IN SIAM

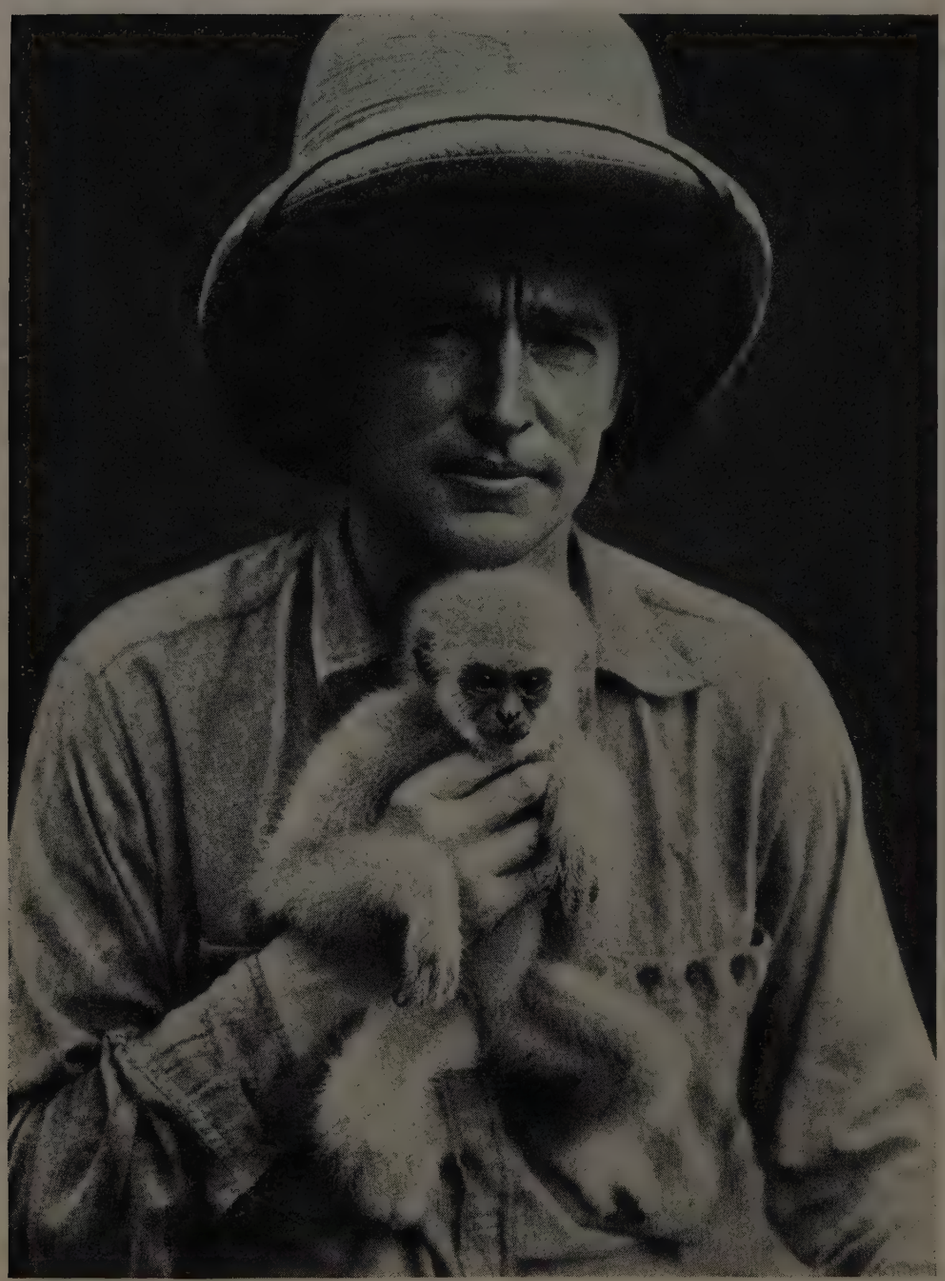
Though our days were passed among these smaller animals, after the tiger our chief interest turned to the elephant—the great beast which has played and still plays such a great part in Siamese life.

NO ROCKING THE BOAT IN THESE WATERS

Both men and women of northern Siam are deft in the manipulation of such canoes, hollowed from sections of palm logs.

SETTING A SNARE FOR SOME UNWARY BEAST

First a small hole is dug and lightly covered with brush or leaves. A noose, also concealed with leaves, is placed on this covering. When an animal steps on the snare his foot shoots into the hole, thereby releasing the rope, which is whipped upward by a bent bamboo pole. The noose is jerked tight about the quarry's leg. A hollow bamboo is placed around the rope just above the noose to keep the animal from gnawing it in two.



A MONKEY THAT ADOPTED A MAN

This little gibbon became so fond of the author that it wanted to be in constant attendance on him and cried like a baby when left alone. It was perfectly content, however, when allowed to sit on his shoulder.

There are thousands of them in captivity in Siam and more thousands still roam the jungles in wild herds.

In captivity the elephants work in the teak forests, are used as transport, and in many places among the simple villagers are employed for such light tasks as hauling rice.

No man may kill an elephant in Siam. No big-game hunter is permitted to trail him to his death for sport or for the value of his tusks.

This was a law which pleased us mightily. Actually we spent more time handling elephants than on any other one animal. And the more we had to do with them, the more we liked them. Both Schoedsack and I thought that many writers overestimated the elephant's intelligence, and certainly he almost never has for his mahout the fierce and savage devotion of a dog for its master; but there is something about the big fellows that is fascinating.

"An elephant has two hearts," says the mahout; "one when he has a man on his back, another when he is alone." It is true. A little dog barking around his legs will sometimes give the biggest of elephants almost nervous prostration from fright, when the elephant is without his mahout; the same beast with a man on his back will just as often prove staunch and brave under conditions of real danger.

On the whole, however, an elephant is a mild fellow until aroused or thrown into a panic; then look out, for he is as likely to run through things or crush them underfoot as to run around them — and he frequently does. And when an elephant has periods of "must"—a condition in the adult male indicated in advance by the appearance of a secretion in the tiny holes behind his ears—he may become dangerous and run amuck.

### THE ROGUE ELEPHANT IS ONE OF THE MOST DANGEROUS OF BEASTS

Ordinarily, an elephant is not a killer, though I have known excellent work-elephants that have killed more than one mahout; but there is the occasional

BRIDGE BUILDING IS A PART OF JUNGLE WARFARE

In their penetration of the wilds of northern Siam, the author and his associates had frequently to cut their way through. Roads were few and bridges still fewer, for the natives considered a stream sufficiently bridged when a single bamboo log had been thrown across it. This serves fairly well for barefooted balancers, but for men with leather shoes such a crossing too nearly suggests a feat of tightrope walking. Mr. Cooper is the central figure with the short rifle.

"rogue" elephant, one which turns bad because of disease, an injury, fury, or for some other reason.

There is no more dangerous beast in the world, then, than the rogue. They have been known to pull houses down to get at the inmates, and to tear men to pieces and trample them into shapeless masses of pulp.

The rogue elephant may be killed in Siam, but no other. However, in place of destroying elephants the natives are permitted to trap them. All over the dense jungle of the country great herds of elephants still roam, and every year men go out and catch them; not, however, by the crude and cruel pit methods of wild savages, but with infinite patience, craft, and skill.

Each part of Siam has a different method. In the north the natives use as a kraal some natural circular land forma-

CHILDHOOD HATH CHARMS TO SOOTHE THE SAVAGE BEAST

The domesticated Indian buffalo is a powerful and rather surly beast, with which the average man would not take any liberties, but children in the Orient lead them around like sheep. It is no uncommon sight to see the tiny son or daughter of a farmer riding on the neck of one of these huge animals, as it slowly makes its way to the rice paddies. In its wild state, this buffalo is a truly ferocious creature and sometimes proves more than a match for the tiger.

tion with very steep sides. The weak places they block with a line of pointed poles slanting inward at a 45-degree angle. Behind these poles are stationed men with torches and guns. A gate is built at the narrow entrance, and through this they attempt to drive the wild herd.

### ELEPHANTS ARE LASSOED IN CENTRAL SIAM

In central Siam they have a very sporting method. They run wild elephants down with tame elephants and lasso them.

This method, which I did not see, has been described to me as follows:

Two men are mounted on a tame elephant. One sits forward on the elephant's neck and carries a sort of combined lasso and steel circlet affair for lassoing the quarry's leg. The second man sits near the stern end of the elephant, facing backward. He is armed with a sharp iron goad (see page 259).

A number of these teams of elephant catchers approach a wild herd as quietly as possible, the men lying flat on the elephants' backs, so as to attract as little attention as possible.

When the wild herd takes alarm, the tame elephants start in pursuit. Each man who sits facing the rear pounds his tame elephant's hindquarters as hard as he can with the iron goad, to force it to as high a speed as possible. When the mahout is close enough he casts his lasso.

A third method is used in the south,

where a great stockade is built in the forest, somewhat oval in formation, with outspread wings and a drop-gate. Into this the natives try to drive a wild herd.

SIAMESE PALS

Gibbons are hard to capture, but are easily tamed. They walk upright, are very affectionate, and make excellent pets. Their long arms enable them to swing through the trees easily and gracefully and with considerable speed (see, also, text, page 250).

### KING'S BROTHER ARRANGES FOR ELEPHANT HUNT

Schoedsack and I wanted to see an elephant drive. The American chargé d'affaires in Bangkok kindly gave us a letter of introduction to Prince Yugala of Lopburi, a brother of the King of Siam. Prince Yugala was then Viceroy of south Siam. I went down by railroad to his capital at Singora and I rode from the resthouse to his residence, a neat bungalowlike building set in a garden of tropical trees.

The prince sat on a sofa in a luxuriously fitted drawingroom, a mixture of Eastern and Western furnishings. He spoke English; for he, like most Siamese royalty, had been educated in English schools and universities.

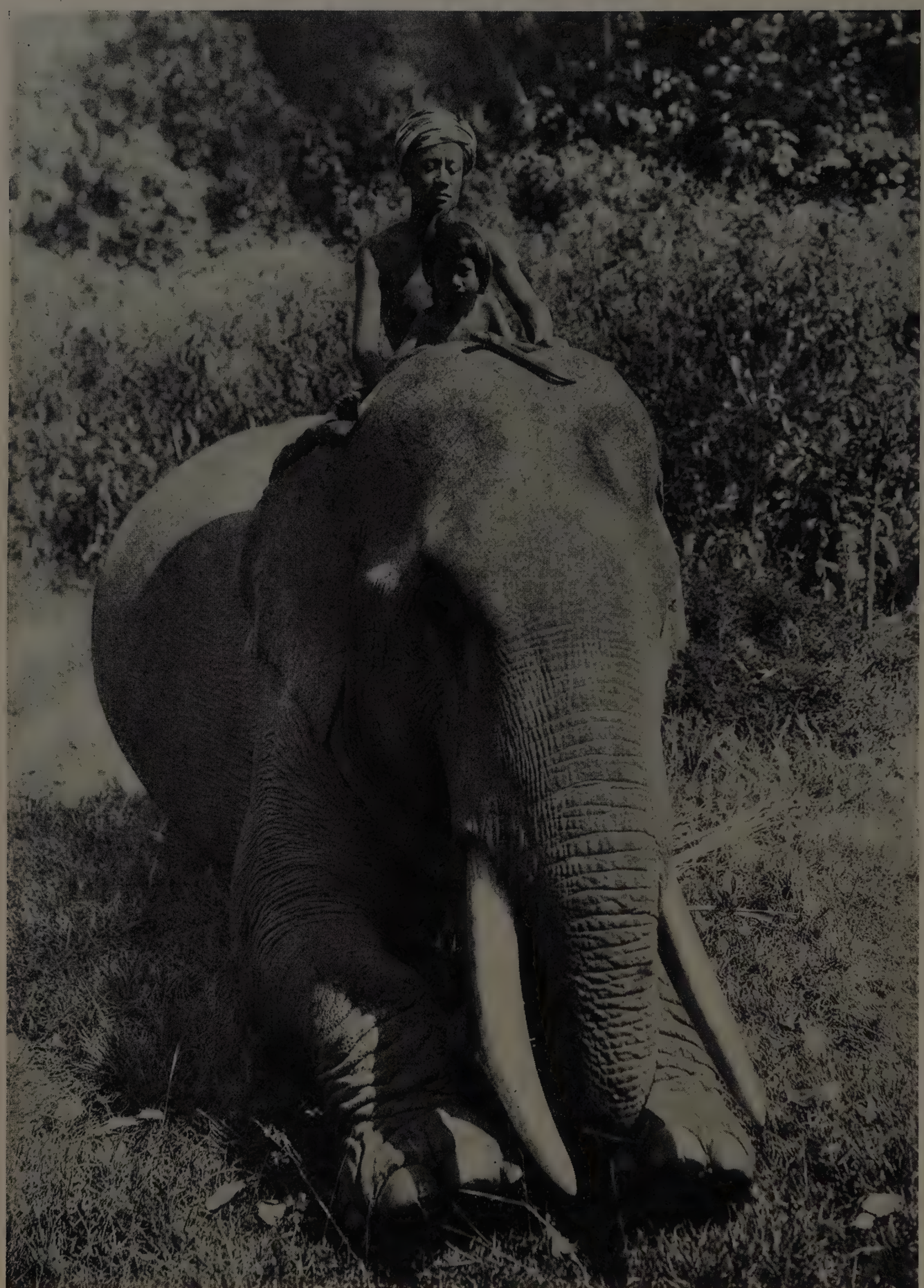
"It will be very easy to do as you ask," he said. "I know an old man who catches many elephants. He will show you how."

As he spoke, a servant came to the door, dropped to his knees, and came waddling across the room, still on his knees, bearing a tray covered with teacups, glasses, and boxes of cigarettes. We drank, smoked, parted.

Prince Yugala kept his promise, and it was through his courtesy that, many months later, when we came back down from Nan, I found myself en route for the place of the drive. Schoedsack was to join me in a few days.

Accompanied by a Siamese gendarme captain who spoke English, I got off the train in the native village of Chawang. It was the usual cluster of Chinese trading stores and bamboo native houses. We were led around the precincts, as no strangers could enter because of a smallpox epidemic there. We walked down to the river, where four boats, sent by the governor at the Prince's order, were awaiting us. Each was covered with rugs; in each boat were four boatmen.

For hours the current bore us along a dark stream, with the jungle black and thick on either side. At last, in the late afternoon, we ran alongside the bank at



TRIUMPH OF MIND OVER MATTER

The mighty beast, having submitted to man's superior intelligence, serves him well. Often a bond of real affection and loyalty is established between them, and the elephant and his master come to understand each other perfectly. Much of the heavy labor performed in the Occident by machinery is accomplished in the Orient by elephants (see text, page 252).

A BABY WITH A MIND OF HIS OWN

This two-months-old elephant objects strenuously to confinement. His owner is attempting to improve his disposition with sugar cane, but is careful to keep out of reach of his trunk; for, young as the captive is, he can deal a surprisingly hard blow.

a little village. Nine elephants were waiting for us, and there was much bowing of the local village chiefs. Our elephants knelt, we climbed aboard to little cramped seats, and were off.

Soon we plunged into the jungle. Darkness came on. Torches were lighted. My elephant led. A torchbearer walked just before. It seemed to me as if I were floating in a sea of blackness, while far below, at the bottom of this dark ocean, shone a circle of red-yellow lights.

Branches from time to time brushed our faces; but my elephant was beautifully trained and made its way forward slowly and cautiously, avoiding the overhanging limbs at the slightest touch from the mahout.

Suddenly more torches ahead and the noise of voices; then the sight of some long, vague shape, and we had stopped before a low bamboo house.

### SIGNS WHICH LEAD TRACKERS TO AN ELEPHANT HERD

Soon an old man came to see me. He was the famous elephant catcher, the chief of this kraal, a rich man, for he was said to own 24 elephants.

He sat himself cross-legged at my feet. His face was wrinkled, the skin of his brown, bare upper body showed the withering of age; yet he moved with the easy grace of a young man and he had brought his women along with him. Their chatter sounded back and forth from the little bamboo house which he had built adjoining the one which he had constructed for us.

"We will catch the elephants for you to see," he said, my captain interpreting for me. "For a week now, my men have slowly driven a herd toward the kraal. It is not a great herd, but my men have counted 18 elephants. My other men are now trying to locate a greater.

"It is not always easy to locate a big herd, for the elephants do not always go the same way. It depends upon the water and feed. Slowly my men must follow. They look at the grass. If it is withered, they know the elephants have passed long before; if only just trodden down, my men know they are close on the trail.

Photograph by R. Lenz

DRIVING WILD ELEPHANTS ACROSS THE MENAM RIVER TO MAKE A "SIAMESE HOLIDAY"

A royal elephant hunt, or "round-up," is the occasion for elaborate festivities in Siam. For weeks beaters scour the jungle and assemble a great herd of wild elephants, sometimes numbering as many as 300. These are carefully guided toward the scene of the round-up. In this particular hunt they have been driven into a river. Boats of all sizes and descriptions hedge them in, keeping at a safe distance. Hunters mounted on tame elephants urge the wild animals across the stream. The shouts of the multitude set the great beasts' nerves on edge, and they trumpet angrily and spout water over

Photograph from H. T. Cowling

THE WILD HERD IS BEING DRIVEN INTO THE KRAAL

The herd has been brought safely across the river (see page 258) and is now milling nervously about before a massive inclosure of teak logs with a V-shaped entrance. Jostled by the tame elephants and pricked by the spears of the herders, the great pachyderms become thoroughly frightened and make a terrific din, which continues unabated until, at a word from the royal party, they are driven through the narrow opening into the kraal. There they remain overnight. On the second day expert catchers mounted on tame tuskers enter the kraal and select from the herd the young animals desired. Their capture is accomplished by passing a noose of strong rattan rope around one of the hind feet. The end of this rope is quickly fastened to the palisade and the maddened animal left to struggle and trumpet until exhausted.

Photograph from Merian C. Cooper

WITH UMBRELLA AND FETISH, A NATIVE ENTERTAINER PLAYS MATADOR TO THE HERD

After a number of desirable young animals have been lassoed and made fast, the remainder of the enraged herd is forced out again into the open plain, and on the third day provides sport for the crowd, which is protected only by a cordon of tame elephants. A young man (central foreground) now strolls out on the field, dressed in bright colors and carrying an umbrella, which he flaunts at the frightened animals. Suddenly one of them dashes toward him. He stands quite motionless until it is almost upon him, and then, with a final flirt of his umbrella, darts hastily behind the tame tuskers, who receive the charge of the baffled beast and drive it back to the herd. A false step may bring a swift and terrible death

They look, too, at the elephants' dung. In two days, maybe, in the sun, this dung will dry completely, and so they can tell how long since elephants have passed. They look, too, for the traces of moles and insects across the elephants' path.

"Oh, there are many things the trackers must watch, long before they ever see the elephants. And they must remember, too, that where there is good grazing and water the elephants travel slowly; if no good grass, the elephants may in one day go ten, twenty, thirty miles."

### THE FEMALE RULES THE HERD

"Can you always catch a herd?"

"No, Ni. Sometimes the elephant herd has a clever queen; for always the female rules the herd. It is she who says how fast they travel or how slow. We think she is the great-grandmother of the herd, and that each elephant herd is mostly made up of the growth of one big family."

I thought I understood what he meant. So, in the same sense, is a desert tribe a large family and is called by a family name, though, of course, new blood is often brought into the family group.

"The elephants often fight, Ni, herd against herd. I know many of your people say this is a lie; but it is true. I myself have often seen the marks of battle; they fight for the good feeding places."

At dawn the next morning I went out. I saw we were in the midst of a deep and lovely forest. Giant trees towered straight up, seeking the sun; and fifty yards away was an oval-shaped inclosure, built of big logs of jungle wood, very heavy and strong, thrust deep into the ground. These were bound together by cross-logs and tied again and again with rattan. Other logs were thrust on the outer side at a 45-degree angle as braces.

At the entrance to this kraal was a huge gate, swung open, and supported for its swing by a thick rattan rope tied near the top of a tall tree. Another rope held the gate in position. At the cutting of this second rope the gate would swing shut on the pivot of the upper rope, swinging from the inside of the kraal outward, so that the trapped elephants, pressing from the inside outward, would only close the gate more tightly.

Outward from the two gateposts palisades extended in a great V-shape, making the gate like the mouth of a funnel, the palisades like the funnel itself, and the kraal the bottle into which the elephants were to be poured.

I spent the morning examining and making notes on the construction and size of the kraal. In the afternoon a messenger came in, saying the elephant herd was not far away and was slowly being driven closer in. I went out to try to see them, though it was already late.

Now the sun disappeared. The forest ceased to be a dark wall spotted with patches of vivid sunlight. It turned into a soft green, each tree trunk, each bush, outlined in the dying gray light. A gibbon gave its tremendous whoop far, far away; birds called on every side louder and louder. Then I heard the noise of the moving of a great body. I stepped behind a tree and waited.

### JUNGLE GIRL GUIDES ELEPHANT THROUGH THE NIGHT

Out into the trail stepped an elephant, but not a wild one, for astride its great gray neck, swinging gracefully to each move of its gigantic roll, sat a jungle girl. She was its mahout. Her skin was a fair olive, her eyes black and large, and straight black hair was drawn back from an unwrinkled brow. She smiled, showing white, straight teeth.

The great elephant waddled on, guided by the bare toes of its little mistress, just reaching behind each flapping ear.

And I was alone in the jungle once more.

Next day more elephants arrived. The governor had sent me the Prince's best for our use—six beauties, all trained in the way of easy marching, with short steps, which lessen the jolting, ungainly natural swing of the average beast. These I sent down to the river to meet Schoedsack, who arrived at night.

The next evening the old elephant master stopped at the door of our bamboo house. His *para* (skirt) was kilted up above his knees, an old muzzle-loader was swung over his shoulder, a rosin torch in a bamboo stem swung at his waist.

"O, Ni, no lights, and all quiet to-night, please, for to-night we drive the elephants."

I called in our boys.

"No lights, no fires, no talking."

BUDDHA CONTEMPLATES A CITY BEREFT OF ITS GLORY

Ayuthia, capital of Siam for nearly four centuries, was destroyed by the Burmese in 1765 and has never regained its ancient prestige. It is situated on an island in the Me Nam River about 40 miles from Bangkok, and most of the ruins are now overgrown by jungle.

A FAVORITE OF THE DANCE

The professional dancer in Siam undergoes arduous training in the difficult undulations and postures which her art requires. Gliding, swaying, and writhing motions take the place of the skipping and pirouetting of the Western dance. The performer wears a gorgeous costume and plasters her face so thickly with white powder that it appears to be incased in a mask.

Tahn, our own chief trapper, his aboriginal, stolid face keen now with the atavistic desire of the hunt, came with us to where a sort of covered pavilion had been built high above the kraal. We climbed up and lay there silently.

A line of men trooped quietly by. They disappeared in the distance. All was quiet, still, very still. We waited an interminable hour; then, from far away, came the noise of beaters rapping on trees, an occasional glint of torchlight.

We knew what was happening. The plan, as usual, was for the beaters to drive the elephants steadily and slowly before them until within the outer edges of the funnel palisades; then, with a great shouting, firing of guns, firecrackers, and blazing of torches, they would try to drive the elephants in a mad rush right through the gate.

On the ground, inside the kraal, dry bamboos were scattered; so that when the elephants trod on them they would be

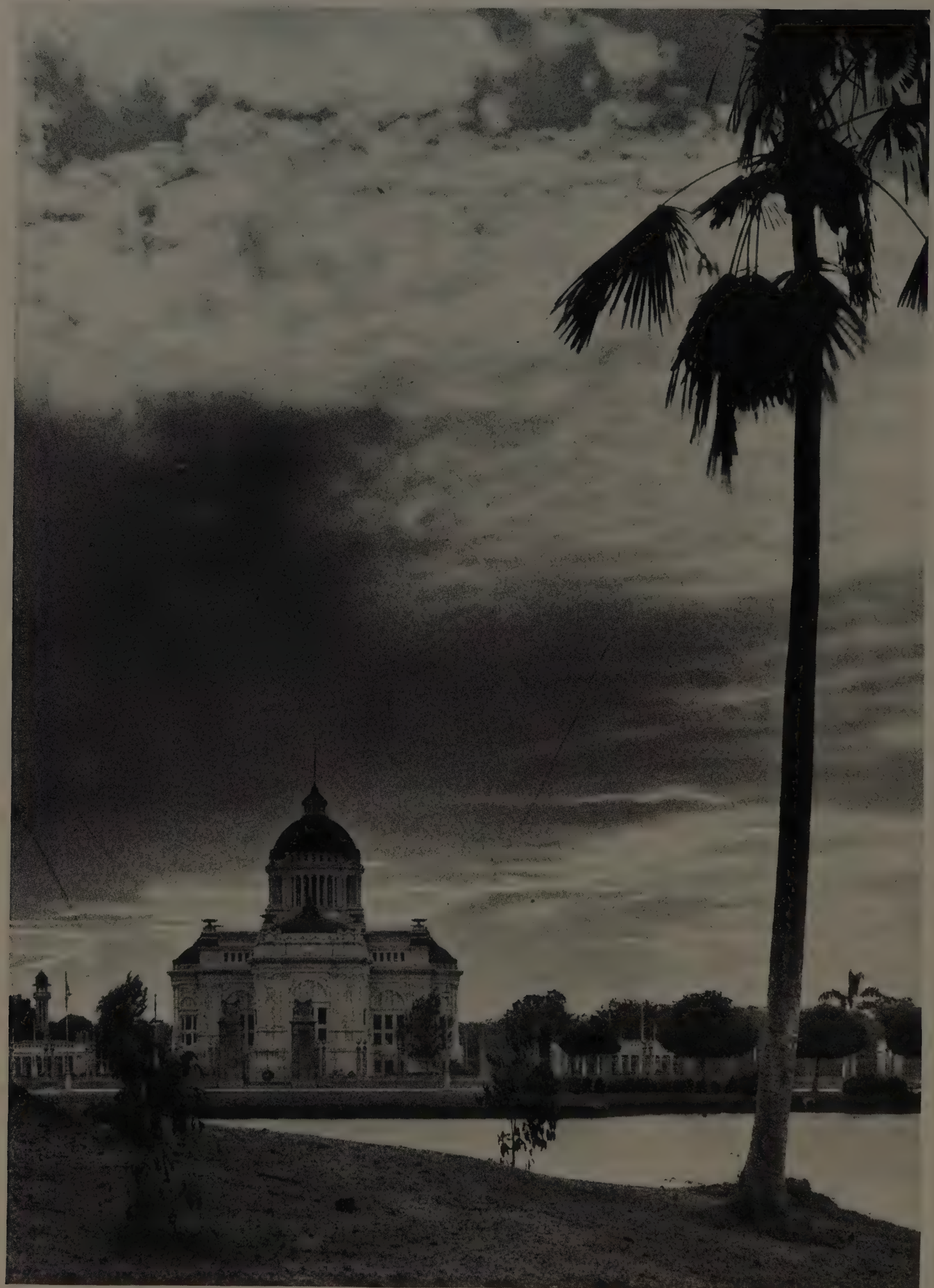
LIQUID MAIN STREET IN A SIAMESE TOWN

While the poorer houses are built of thatch and bamboo, those of more prosperous classes are made largely of teakwood and roofed with tiles. Frequently a village will be built up along both sides of a stream or canal, the waterway furnishing the principal traffic artery of the community.

Photograph by W. Robert Moore

A SIDEWALK THEATRICAL PERFORMANCE

Small tent theaters operate in side streets of the capital, the players putting on their make-up before the audience. Siamese drama is so hedged about by tradition and convention as to be almost incomprehensible to a stranger. The stage consists of an oblong space with the audience on three sides and the fourth side reserved for the orchestra and players. Dancing is usually a principal feature of the entertainment.



Photograph by Herbert

THE THRONE HALL AT BANGKOK IS OF EUROPEAN DESIGN

This handsome building is one of the finest examples of Occidental architecture in the Orient and is indicative of the impress that contact with the Western World has made upon Siamese royalty. Practically all of the princes royal are educated in Europe, the present king being an Oxford man (see text, page 268).

crushed, and the crackling noise would be a signal for the man at the rope to cut it, letting the gate close.

We waited long that night; finally, the old elephant catcher himself came back, saying that there had not been enough firecrackers and torches to stampede the elephants, but that his men had them tightly closed in with a circle of fires, from which they could not escape, and tomorrow night—then!

### A WITCH DOCTOR WRECKS THE DRIVE

The next night came. Again we took our places; again the breathless stillness. And now, nearer and nearer came the noise of the beaters. A great angry trumpeting, a shrill squeal, the sound of great bodies crashing through brush. The elephants were near, very near.

"S-h-h!" we whispered to our excited boys. We scarcely dared stir for fear the elephants would locate the kraal in front of them by some sound from us.

At that moment, to our horror and astonishment, a light appeared at the door of the platform just across the kraal from us, a platform raised high above the kraal and close to its wall, as was ours.

"What in blazes could that be?"

We cursed under our breaths.

More noise from the elephants coming toward the kraal. Singing, and the light across the way began to dance about!

Louder and louder the man carrying this light sang. Surely he would scare away the herd. Now, pandemonium from the elephants. Shouts, gunshots, yells from the beaters. Then a great crashing—and the noise of the elephants died away in the distance. . . .

Later, once more the old elephant master returned, with the sad news this time that the herd had broken through the line, nearly killed one man, and was in full flight, miles away by now.

The drive had failed.

We were filled with wrath at the singer and light-swinger. He had scared away the elephants, we declared loudly. But this, we were told, was impossible. The singer had been the witch doctor, praying and chanting to overcome the evil spirits of the kraal, so that the elephants would surely enter!!!

And the witch doctor blamed the failure on us. He said a camera platform we had built had made the spirits angry, and that they had driven the elephants away.

For eight months after this Schoedsack and I continued our work with elephants, other wild beasts, and natives; and it was due only to the kind aid given us by Prince Yugala, Prince Damrong, and others of the Siamese royal family that we were able to get the results we did. They smoothed our way everywhere, for the authority of the royal family is complete.

Indeed, Siam is one of the only three absolute monarchies left — Afghanistan, Ethiopia, and Siam. Theoretically and practically, there is no limit to the power of the King of Siam in his own territories. He is the supreme law; in fact, he can make and unmake laws at will. No parliament hampers his movements, and he chooses his own advisers as he sees fit.

### AN AUDIENCE WITH THE KING IS ARRANGED

Such a ruler in this modern world is one of the most interesting and romantic of men, and we were glad to have the chance of a private interview.

Schoedsack and I were on our way out of the country. We came down out of the northern jungles thin, brown, ragged. I asked for an interview with the King, little thinking that he would be able to arrange it, for his time is filled with official duties and we had but three days in Bangkok before going south. But at noon, the day before our departure, the American Minister sent word to the hotel that the King would receive us at 2 o'clock that afternoon—uniform, full evening dress.

We had no evening dress. As usual, we were traveling light, and moths had played hide and seek through the trousers of the dinner clothes I had left in Bangkok a year or more before.

There was no hope for Schoedsack; his six feet five could not be readily clothed in Bangkok; but the American colony came to my aid in a hurry, and in an hour, arrayed in the coat of the Minister, the trousers of the Manager of the International Engineers, and with the Consul's high silk hat perched precariously on top of my head, I was speeding along in an automobile to the palace.

Solomon in all his glory felt no grander than I, thus transformed into such a thing

of misfit grandeur and beauty, after a year in camp rags.

The palace of the King lay some distance back of the throne hall (see page 266). At the gate stood a guard carrying old-fashioned halberds, and as I jumped out of the automobile two officers in spotless white uniforms greeted me in perfect English. We walked up a drive together and entered the palace.

Rich furnishings filled a large room hung with European paintings.

One of the court chamberlains entered—a lean, dignified man of forty. He, too, spoke English. Many of the Siamese nobility—in fact, most of the higher nobility—are educated in England or France.

"Where is Mr. Schoedsack?"

I made apologies for Schoedsack. Consternation. The reception called for two of us, and here was only one.

### SIAM'S KING IS AN OXFORD MAN

A servant brought in tea and cigarettes. He dropped to his knees as he served us. The officers and the chamberlain spoke of London and Paris, but without sighs of regret, for nearly all Siamese are happy in their own country and love its ways and life—the winding, green-banked rivers, the coconut trees, the wayside temples, and the long sunshine-filled days.

Fifteen minutes. Another chamberlain entered. We walked through another suite of rooms, likewise richly furnished; then up a flight of stairs. Now the chamberlain swung open a door, drew aside, after bowing deeply to some one inside, and motioned me to enter.

In the center of a high-ceilinged, very large room stood a slight, upright figure in the uniform of an officer. There was little gold lace or other ornamentation about his dress and a single decoration was pinned on his coat.

I recognized the King. He advanced, stretched out his hand, took mine; then motioned me to a seat in a high-backed chair facing his, meanwhile saying a few conventional words of greeting.

As we sat facing each other, I looked at him curiously and carefully—this man, so great among his own people, one of the last of kings.

There was no pretense or pompousness in his manners. His eye was clear, and only occasionally did he gesticulate with firm and even movement of the hands, as he spoke. His English was perfect; and well it might be, seeing that he had been educated at Eton, Oxford, and Sandhurst. He is now 34 years old, and a great portion of his life has been spent in England, though he completed his military education at St. Cyr, in France, before returning to Siam.

"I know your country of America," he said. "I have traveled there. You believe in democracy, and, strange as it may sound, coming from me, I, too, believe in democracy and in representative government. But the time is not yet, in this country, for such a government. It is necessary to raise our people to a higher stage of civilization first.

"Education and schools are the way. But schools cost money, and we are a small nation and not rich. As we increase our cultivated areas, we shall have more money."

We talked along thus for a half or three-quarters of an hour.

Abruptly the King rose.

"I must ask you to excuse me. I have to attend a ceremony," he said.

We shook hands and parted.

At the door of the palace, as I went out, I saw standing a Rolls-Royce ready for the King. A line of other motor cars waited behind. Five minutes after my departure the King was on his way to a temple to take his part as the head of the religion of his country, in some age-old function.

I rode home thoughtfully. I remembered the former King of Siam, this man's elder brother. When Schoedsack and I had first come there, over a year before, I had seen him play in private theatricals, a man who devoted nearly all of his time and much of the money of the kingdom to his huge private theatrical troups, so all said in Bangkok. And now I thought of this young King, entering upon his new duties filled with the belief that a king should be "the father of his people, not their oppressor." And he was in earnest, too. No doubt of that.

So I was thinking when the Consul's silk hat nearly blew off into the street, as my car swung sharply around a turn, and I was back at the hotel ready to go south through the Malay Peninsula on our way home once again.

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# MICHIGAN, MISTRESS OF THE LAKES

By Melville Chater

Author of "Motor-Coaching Through North Carolina," "Dalmatian Days," "Through the Back Doors of France," "The Shores of Sunrise," etc., etc., in the National Geographic Magazine

*With Illustrations from Photographs by Clifton Adams, Staff Photographer*

"SO THIS is China!"

Such was the happy conviction of Monsieur Jean Nicolet as, appropriately attired in a robe of Chinese damask, he discharged his pistols over the heads of the astonished Indians on the western shores of Lake Michigan in 1634.

It is said that the Canadian town of Lachine satirically memorializes in its French name, *La Chine,* the mistake of early French explorers in assuming that the "sea people" living on a "great water," of which the Algonquins had told them, were inhabitants of the Flowery Kingdom. Nevertheless, the error brings home to one the vastness of those inland waters which Nicolet took for Chinese seas.

As he and his Indian paddlers emerged from the primeval forests of New France and gained the Great Lakes, their frail canoe was on the threshold of one of Nature's most majestic creations.

Before him lay a third of the globe's fresh-water area, stretching away in five confluent bodies lying end to end. He was surrounded by water surfaces which exceed the present aggregate areas of Belgium, the Netherlands, Denmark, Switzerland, and Portugal. Had he followed the five Lakes' outflung coasts along what was later to be called the American side, he would have canoed 3,774 miles, or about the ocean distance he had come from Old to New France.

Could the Indian guide of Monsieur Nicolet have foreseen modern mathematical computations, and had he remarked, "White man, if all the world's rivers flowed into these lakes' emptied basins, twelve moons would be needed to fill them," doubtless the Frenchman would have coughed politely and said, *"En avant!* On to China!"

## THE FIRST WHITE MAN ON MICHIGAN'S TWO PENINSULAS

Furthermore, Nicolet might have noted that four of the Lakes washed the outline of two lengthy peninsulas whose tips came within six miles of touching. The first white man to tread the shores of Michigan's two peninsulas, he paused at what later Frenchmen named the Sault, or Falls, of Ste. Marie; then paddled onward for the supposed Orient.

Looking backward from to-day, when Michigan enjoys direct water communication with seven sister States and Ontario Province, with their more than 40,000,000 people — when on Michigan's northern shore the St. Marys Falls Ship Canal gives passage to the greatest lock traffic the world has ever known—one wonders if Nicolet didn't make a mistake in wanting to push on to China.

Michigan, anciently a lakeless region, owes her debt to the Glacial Period, when vast ice packs thrice advanced and thrice

AN ALL-METAL TRI-MOTORED PLANE IN FLIGHT OVER DETROIT, CITY OF ITS MANUFACTURE

The frontier fort of two centuries ago has become one of the great cities of the world, with a population of more than one and a third millions and a diversity of industrial interests probably unsurpassed (see, also, text, page 279). In the distance, across the Detroit River, is Windsor, Ontario.

Photograph by John A. Wiederhold

DETROIT HONORS THE BIRTHPLACE OF HER NEWEST IMMORTAL

Col. Charles A. Lindbergh may be seen in the back seat of the automobile, following the dedication of a memorial tablet at his birthplace, 1120 Forest Avenue West, Detroit. The house is decorated with flags.

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A HARBINGER OF THE COMING AËRIAL AGE

The great United States Navy dirigible *Los Angeles* is secured to a mooring mast at the Ford Airport near Detroit.

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MICHIGAN TAKES HER ATHLETICS WHOLESALE

The mammoth field meet held on the athletic grounds at Belle Isle in June, 1927, brought together 24,000 registered contestants, about 900 officials, and nearly a quarter of a million spectators. It was arranged by the Health Education Department of the Detroit public schools and sponsored by the *Detroit Free Press*. Four hundred tents were pitched around the field to provide headquarters for the contesting teams (see, also, text, page 286).

Drawn by A. H. Bumstead

THE WESTERN HALF OF MICHIGAN'S UPPER PENINSULA

Following the dispute of 1835-37, the Wolverine State with reluctance relinquished her claim on the so-called "Toledo Strip," embracing an area of less than 500 square miles, in exchange for the entire Upper Peninsula, with an area twice as large as the State of Massachusetts. At the time of its transfer this wilderness was considered practically worthless; but, like "Seward's Folly" (Alaska), it has proved a veritable bonanza of mineral wealth (see text, page 310).

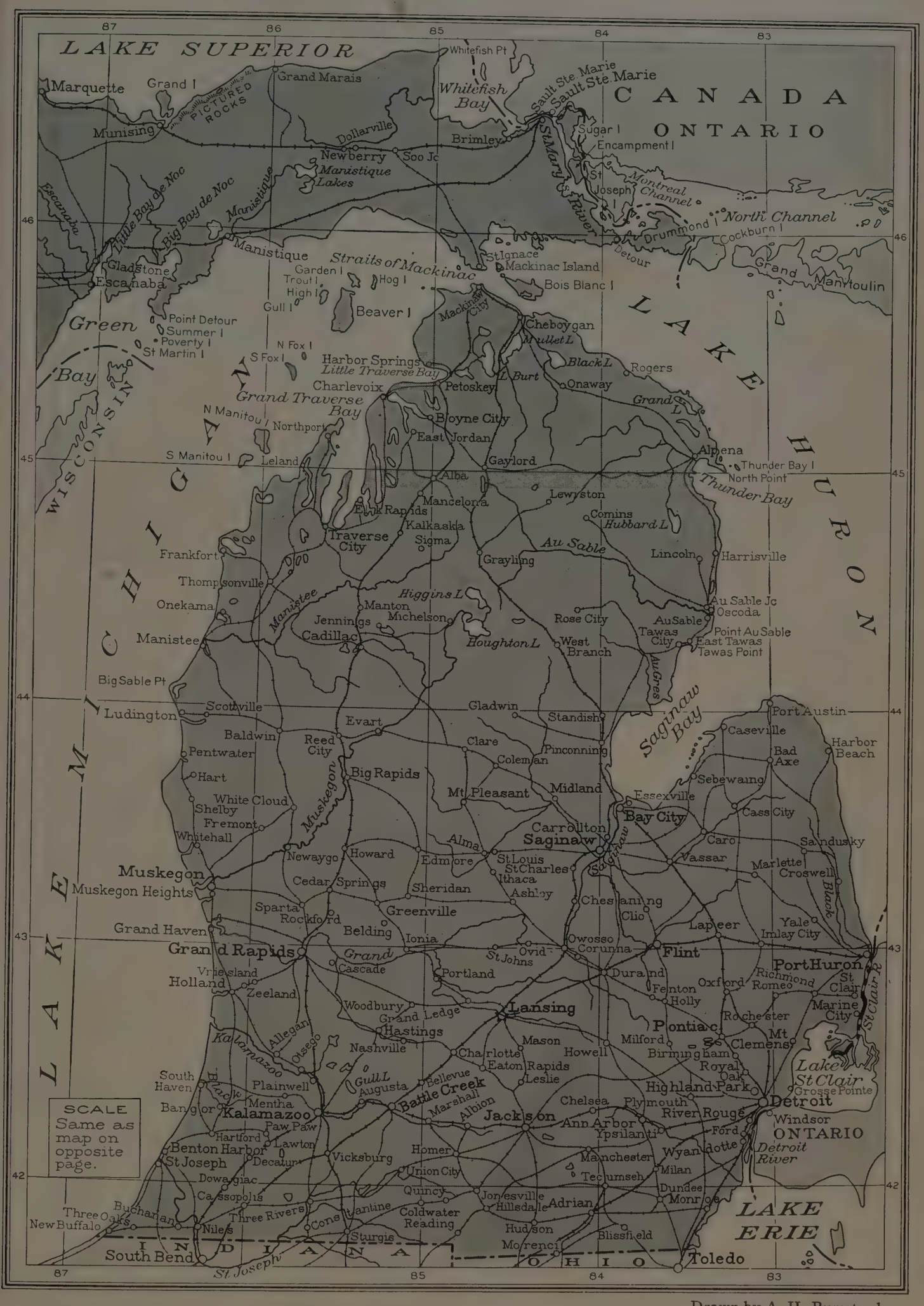
retreated over her river basins and valleys, carving and deepening these into Titanic gullies; for upon the melting back of the third so-called "Wisconsin" drift the parent bodies of the Great Lakes appeared.

### TWO-FIFTHS OF MICHIGAN'S SURFACE IS WATER

In giving Michigan a coast line of 1,750 miles, the Great Lakes have endowed her with a unique individuality.

Having regard to her more than 5,000 inland lakes and such exterior lake areas as lie within her boundaries, the State's surface is more than two-fifths water.

Her very name echoes Indian syllables referring to water. "Mich-sawg-ye-gan" means "the lake country." The Indian name for the "Big Sea-Water" is familiar to every reader of "Hiawatha," and possibly Lake Michigamme, in the Upper Peninsula, offers in its name some phonetic link between "Gitche Gumee" and "Michigan."




Drawn by A. H. Bumstead

A MAP OF MICHIGAN'S LOWER PENINSULA AND THE EASTERN HALF OF THE UPPER PENINSULA

Photograph by John A. Wiederhold

"SHEBA" TAKES HER OWNERS FOR A RIDE ON BELLE ISLE

When the children of Detroit decided they wanted an elephant, they saved up their pennies and bought one. Popular ballot gave the pet her name.

Were her people romantically inclined, they might quite reasonably imitate the old Venetian doges by dropping rings overboard and "wedding" Michigan to the Great Lakes.

### A NOTABLE LIST OF EXPLORERS HEADED BY LA SALLE

For seventy-odd years following Nicolet's exploration, Jesuit missionaries canoed the Great Lakes, preached, and suffered unto martyrdom.

Establishing their bases in Michigan's strait region, they inhabited the bark-covered lodges of the Ojibways, Ottawas, and Potawatamis, smoked their pipes, recorded their legends. From the forest wilderness they addressed the civilization they had renounced, now requesting lively pictures of hell, now urging that the Church's salvation and the fur traders' brandy selling should not go hand in hand.

The Jesuits' long list opens with Fathers Jogues and Raymbault. It includes Father Marquette, who, with Louis Joliet, descended the Mississippi. It ends with Fathers Carheil and Marest. When the last-named burned their chapels at Mackinac and quitted the region, there closed a régime which, offering itself as a shock absorber for later explorers, had left deathless examples of patience and heroism.

Midway in the Jesuit period towers the great name of Robert de la Salle. His part in winning the unknown West forever stamps the Lakes region with associations of this high dreamer and doer, the "captain of his soul." La Salle achieved his ambition of discovering the Mississippi's mouth, and later, while leading an ill-fated colonizing expedition, was murdered by his own men.

### JESUITS PUBLISHED EARLY MAP OF LAKES REGION

It was the early Jesuits who published one of the first maps of the Lakes region. It was some much-later geographer who has stirred the imagination of millions of school children by announcing that Michigan's Lower Peninsula is mitten-shaped, and that her Upper Peninsula resembles an arrow set on a bow.

Symbols suggesting snows, loggers, trappers, and Indians convey sharp profiles of the State's pioneer era. But it occurs to the present-day visitor, who finds Michi-

Photograph courtesy the *Detroit News*

ON ONE OF THE ICE-COVERED LAGOONS OF BELLE ISLE, DETROIT

Photograph by John A. Wiederhold

HUNGARIAN DANCERS IN A STRANGE SETTING

The rapid industrial development of the city of Detroit has drawn to it immigrants of various nationalities. Although their coming has created many municipal problems, they have provided a colorful note against the drab background of giant industry. These Hungarians, in native costumes of red, white, and green, are enjoying the *csárdás,* a dance of their homeland.

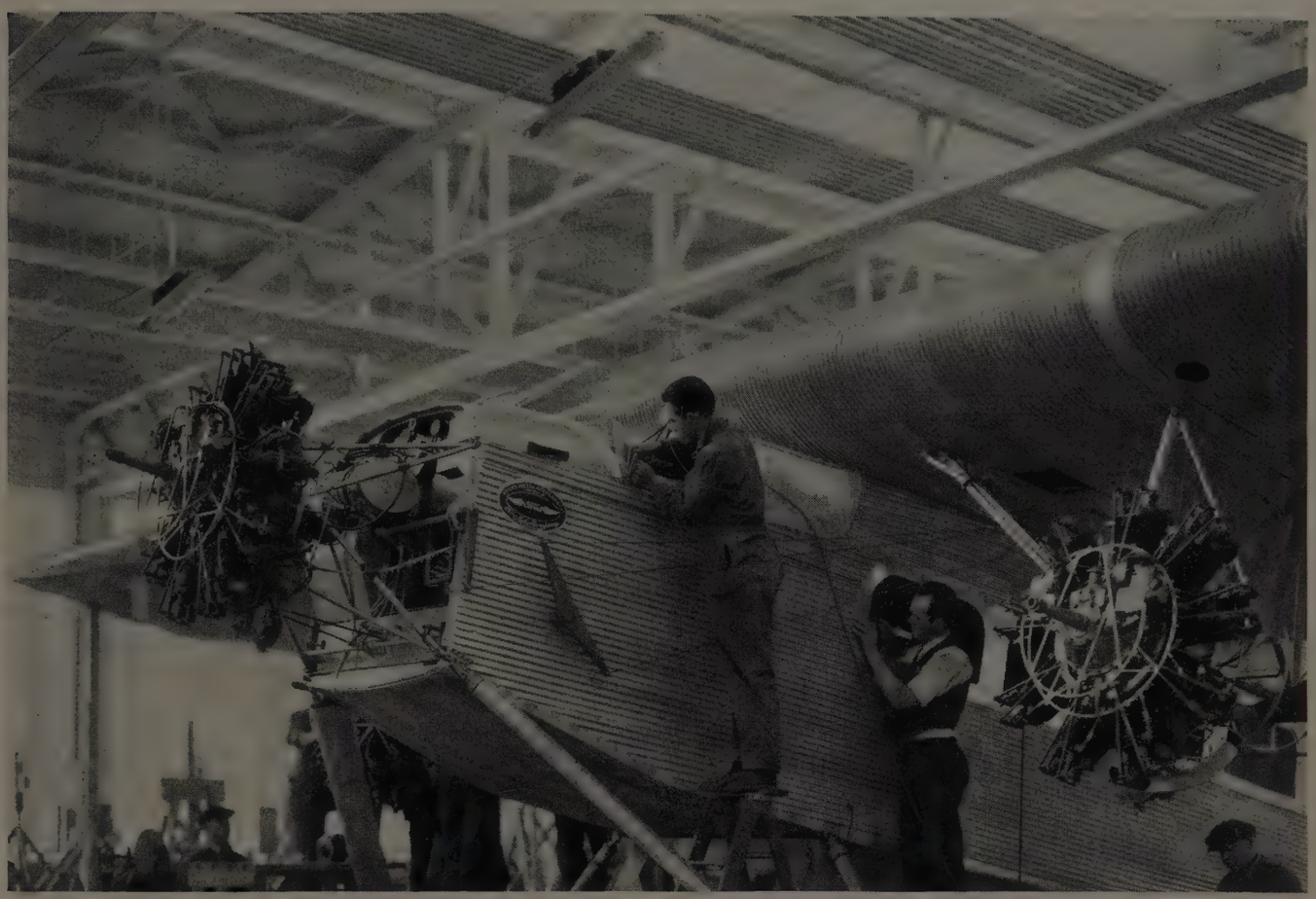
A BEAUTIFUL PARK LIES AT THE HEART OF MICHIGAN'S METROPOLIS

Grand Circus Park is a maple- and elm-shaded area almost in the center of the business district of Detroit, with many theaters, office buildings, and hotels grouped about it. The streets converging here are Woodward and Washington avenues.

Photograph courtesy the *Detroit News*

AMONG THE FASTEST THINGS AFLOAT

Speed lovers have not confined their activities to the air and the open road. They have invaded Neptune's realm as well, and some of their power boats develop a speed of more than a mile a minute. Detroit has played a conspicuous rôle in the development of fast motor boats.



THE CITY OF AUTOMOBILES IS TAKING TO THE AIR

Airplane manufacture is assuming a prominent place in Detroit. This type of all-metal plane, equipped with three motors of 200 horsepower each, is used by various air transportation companies to carry mail, freight, and passengers.

gan's log jams a memory, her few Indians undiscernible among an estimated population of four and a half million, her forests largely replaced by farms, her early industries obliterated by factory systems, that the State needs a new symbol, something which conveys her emergence as an industrial power.

Applying Michigan's actual dimensions to the two familiar symbols would add a couple of Gargantuan tales to those told in logging camps about Paul Bunyan, the lumberjacks' mythical hero. The "mitten," which by motorcar travel measures more than 1,000 miles in circumference, would just about suit Paul's wife, Carrie, who used "thirteen Hudson Bay blankets and the sails of a full-rigged ship to make her a waist and skirt."

As for the "bow-and-arrow," the circling of which adds 800 more miles to your speedometer, Paul would certainly have given it to Teeny, his gigantic youngster, as a toy. And if Teeny had ever inquired, "Pa, how did Michigan get bust off into two pieces?" Paul would probably have explained, "Log jams was so big in them days that I had to kick a hole through it so as to get them from Lake Michigan into Lake Huron."

### A KING'S HAT GAVE DETROIT ITS START

Immediately after the Jesuit régime Detroit steps into the historical picture. Oddly, it owes its original settlement to the hat of a king of France.

One day Louis XII ostracized the prevalent velvet cap by appearing in a queer, lofty-crowned affair of beaver fur. Because other fashion-setting monarchs imitated him and because the beaver supply, though limited in Europe, was plentiful in New France, Indians were soon paddling their canoes 500 miles to Michilimackinac to trade their furs for French brandy.

But the British, who had also succumbed to the beaver-hat craze, began coming from Fort Orange (Albany, New York) up Lake Erie to the future Detroit region, which was then known as the Beaver Country. These "perfidious" British, who distilled a rum cheaper than French brandy and with an equal "kick," doubled

CATBOATS RACING ON LAKE ST. CLAIR

Photographs courtesy the *Detroit News*

FEW SPORTS OFFER A GREATER THRILL THAN SAILING ON THE ICE

A fleet of winter pleasure craft ready for a race over the smooth ice of Lake St. Clair.

Photograph courtesy the *Detroit News*

FAIR DEVOTEES OF ICE BOATING

their firewater allowances in bartering for peltries!

The Indian trappers forsook Michilimackinac. In commercial parlance, the fur trade became "diverted" to Detroit.

### "THE BIG VILLAGE" GROWS DESPITE FIRE AND SWORD

Hence it was that in 1701 Antoine de la Mothe Cadillac, sometime commandant at Mackinac Island, came from Montreal with 25 canoes loaded with soldiers and *voyageurs* to build a lake-barring stockade, known as Fort Pontchartrain, on the *détroit* (strait) which ultimately gave Detroit its name.

But the whole vast region of New France was destined, as a result of the French and Indian War (1754-1763), to become a British province. Lacking agricultural development, France's century-long régime in the Lakes region had achieved no more than the establishment of trading-posts at the Sault, Michilimackinac and Detroit.

In 1763 Detroit escaped massacre by a hairbreadth and withstood a six months' siege. This was a part of the federated Indian tribes' simultaneous but unsuccessful attack on all British posts west of the Alleghenies.

Her next escape was when the Spanish, overstretching their conception of what Florida included, unsuccessfully invaded south Michigan in 1780-81.

When the future State was finally surrendered by the British in 1796, nobody attached undue importance to a village named Detroit, with its 500 inhabitants and its area of less than a square mile.

Skip 132 years and Detroit reappears as the Nation's fourth largest city, with an area of more than 140 square miles, a population of 1,334,000, and an industrial-products value of $2,000,000,000 a year. Yes, Detroit has handsomely realized her old Indian appellation of Yondotega, meaning "the big village."

Approaching the city by lake steamer, one beholds a striking panorama. The Canadian side shows many miles of green meadow, while the American side reveals a gradually intensifying spectacle of mammoth cranes, towering stacks, vast fac-

THE CAPITOL BUILDING AT LANSING, ONE OF SEVERAL TO STAND ON THIS SITE

At the time that it was laid out for the State capital, only one family was living in Lansing; to-day it is one of the leading industrial centers of Michigan (see, also, pages 290-294).

tories—all of industry's bewildering panoply.

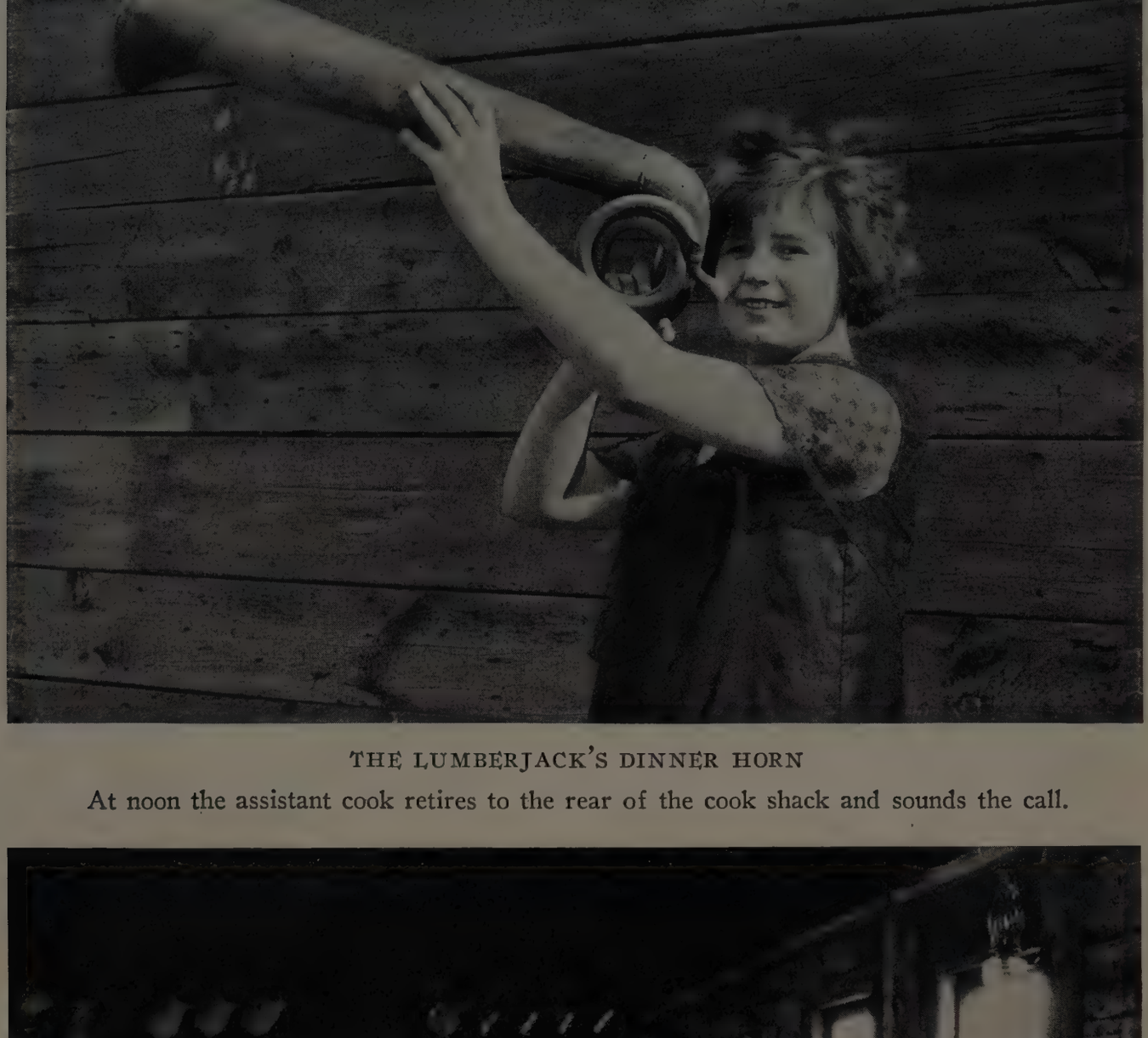
### A CITY WITHOUT SLUMS

Detroit's industries employ some 350,000 workers, who are massed in units attaining to 55,000 or 65,000 in a single establishment. It is, of course, her automotive industry, which predominates in this mass employment.

Yet, notwithstanding so large an industrial population, Detroit may fairly be described as a slumless city. One hint of its workers' well-being is found in local savings-banks deposits, which totaled $408,000,000 in 1927. Moreover, the scores of superintendents' motorcars which were parked around automobile factories ten or fifteen years ago have since swelled into the thousands upon thousands owned by the factory hands themselves. The famous taxicab army of the Marne has nothing on the spectacle of Detroit's industrial armies motoring to work. It is a striking instance of percolated prosperity.

Lest the motorcar bulk disproportionately on Detroit's skyline, it should be remembered that the city's 3,000 major manufacturing plants include 35 lines that fall into the million-dollars-a-year class of productivity.

In fact, ever since the days when Detroit made the first gold pens, ran the first refrigerator cars, and built among the earliest of sleeping cars—and, tradition adds, mixed the first ice-cream soda—the Michigan metropolis has been a plexus of diversified manufacturing.



THE LUMBERJACK'S DINNER HORN

At noon the assistant cook retires to the rear of the cook shack and sounds the call.



THE FAVORITE INDOOR SPORT OF MICHIGAN LUMBER CAMPS

A unique feature of some of the camps is the absolute silence maintained at meals. This rule very effectively prevents arguments, which might lead to brawls, broken dishes, and broken heads. A lumberjack's appetite is proverbially good and the camps furnish plentiful quantities of wholesome food.

IN YEARS GONE BY SAGINAW WAS A CENTER FOR MANUFACTURED LUMBER PRODUCTS

A vessel has just discharged a cargo of a million board feet of rough lumber from a Canadian port, which one of Saginaw's few remaining mills will finish for ready-cut houses (p. 295).

Her growth, measured in terms of population, has increased more than 360 per cent during this century. Indeed, her present roll of industrial operatives surpasses by more than 60,000 her total population of 1900.

Measured by her usage of electric light and power, she has grown forty-fold in twenty years.

### REBUILDING DETROIT'S SKYLINE

Such growth plays hob with exclusive neighborhoods. Jefferson Avenue has become metamorphosed with garages and apartments. Woodward Avenue, with many a fine old mansion's front yard now hedged between automobile salesrooms and doing duty as a public parking space, has recharacterized itself as Gasoline Row (see page 278).

Notably within the past ten years the office cloud-toucher has taken its place in Detroit's skyline, and apartment hotels and hotel skyscrapers cannot be reared fast enough to keep pace with her growth. In fact, Detroit's rapid changes in physiognomy justify the English writer who remarked of American cities, "Wrecked buildings spring up like mushrooms."

Everywhere the traffic problem is seen in an endless procession of motorcars and in parking spaces, where these cars are ranged as thickly as peas in a pod.

Commuting by your own car, whether from the boulevards or from the beautiful suburbs of Grosse Pointe, Indian Village, Bloomfield Hills, and Oakland Hills, is no joyride; for Wayne County's automotive registrations total 396,000, and twice daily comes the big traffic jam, caused by a large proportion of those cars reaching or leaving Detroit's industrial

Photograph by Benjamin Wallace Douglass

LOGS ON THEIR WAY TO BECOME PAPER

Timber was one of the first sources of Michigan's prosperity, and many a town in the twin peninsulas grew up around a sawmill. There are still great timber resources in the State, and it is no uncommon sight to see huge rafts of pulpwood logs being floated downstream for the consumption of paper mills (see page 293).

Photograph courtesy the *Detroit News*

THE HORSE HAS NOT BEEN ENTIRELY DISPLACED, EVEN IN THE AUTOMOBILE STATE

In the lumber camps there are certain kinds of work that can be done better by horses than by motors, and the strong and faithful animals are still to be found on the job.

AT THE END OF THE LONG PRODUCTION TRAIL

Radiator caps and hoods are the last things to be put on the cars at the end of the unified assembly line of this great automobile plant in Michigan (see text, page 299). Then gas and oil are put in the tanks and each car is tested before being shipped or driven away.

plants or its office section of about one square mile.

Southey's jazz poem of "How the waters come down at Lodore" might well he readapted to describe "How the flivvers come into Detroit."

### DETROIT'S ENCHANTED ISLAND

One turns gratefully from Detroit's traffic-choked thoroughfares into that loveliest retreat of all her 3,000 acres of park space—Belle Isle (see illustrations, pages 273, 276, and 277).

In trading 8 barrels of rum, 3 rolls of tobacco, and 6 pounds of warpaint for the Indian-owned Belle Isle, the city's forefathers achieved something not to be expressed by its present valuation of many millions of dollars; for Belle Isle Park is at once the worker's restful Avalon, treasure-hunting childhood's pirate lair, and everyone's Enchanted Island, with songbirds as Ariels and caged bears as Calibans. What more intriguing than a wooded island park, canalized for canoeing, dotted with picnickers' stoves, and visited by a symphony orchestra—this on the edge of a great industrial city?

On a fine spring day as many as 246-000 automobiles, containing representatives of Detroit's 40 nationalities, have visited Belle Isle Park.

Detroit was the State's first capital, and not until 1848 did Lansing assume that dignity. Meanwhile much water had flowed under history's bridges.

Photograph from General Motors

TESTING AUTOMOBILES AT SPEEDS UP TO 125 MILES AN HOUR

The east end of a high-speed track in a 1,250-acre proving ground at Milford, near Pontiac. Here several different makes of automobiles and trucks are tested for speed, power, acceleration, hill climbing, steering effort, gasoline and oil consumption.

The Northwest Territory had been created in 1787, and out of this the subterritory of Michigan had been carved in 1805. The War of 1812, with its opening campaign on Michigan's soil, had come and gone. The public land sale of 1818 had tempted settlers to Michigan's remote wilderness. In 1825 "Clinton's ditch," the Erie Canal, had established water connection between the Great Lakes and the Hudson. In 1837 Michigan, with 174,000 people, had become the twenty-sixth State of the Union. And finally there had befallen, between 1836 and 1844, her boom period of land speculation, wildcat banking, and railroad building.

### WILDCAT BANKING WAS BORN IN MICHIGAN

With public lands acquirable at $1.25 an acre, one needed only an impressively elaborate map and the gift of imagination to sell "town sites" which were destined never to exist beyond the domain of eloquence. Water power and sawmills figured largely in the sales talk, but subsequent realization too often resembled the experience of one investigating agent who wrote his distant client: "I found the location; also a dam by a millsite, but no mill by a damsite."

The term "wildcat banking" refers to the sumptuous paper money, stamped with wildcats or dashing steeds, which flooded Michigan as a result of a general law permitting any ten or more freeholders to form a banking concern.

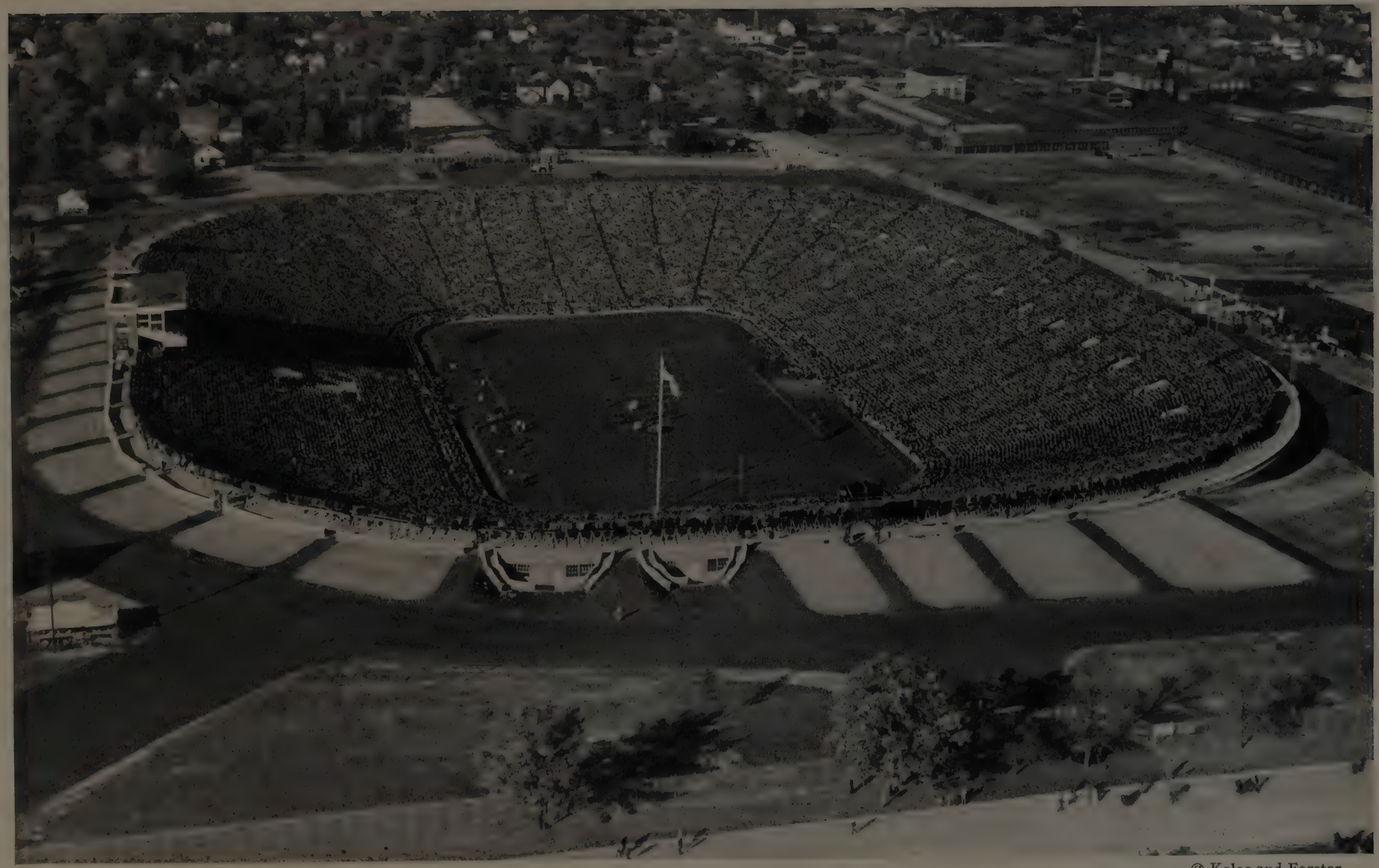
The State was soon dotted with mushroom banks, and the too trustful pioneer's cash was "on deposit" in anything from a cellar to a sawmill. Each bank's actual specie being in inverse ratio to its issued paper, a traveling reserve fund was adroitly spirited from town to town in time to meet the visiting examiner's eye.

### WHEN RAILROAD TRACKS FIRED ON PASSENGERS

With the abrogation of this law in 1844, many a magnificently entitled but fly-by-night concern—the "Bank of Singapore" among them—faded out, leaving a de-

ONE OF AMERICA'S GREAT SEATS OF LEARNING

Angell Hall is among the largest buildings on the campus of the University of Michigan, at Ann Arbor. It is used for literature and science classrooms and for the administration offices. Michigan has played a conspicuous part in the progress of American education (see text, page 299).



© Kalec and Forster

THOUSANDS ASSEMBLE IN ANN ARBOR'S STADIUM TO SEE MICHIGAN'S GRIDMEN DEFEND THEIR TITLE

Approximately 86,000 people fill every available foot of space whenever the Wolverine State's university team goes into action against a major rival.

MUCH OF THE WORLD'S PEPPERMINT COMES FROM MICHIGAN

Its chief uses are for flavoring dental preparations, confections, and chewing gum. This peppermint farm covers 2,200 acres.

serted village. And the hardware fraternity received back many a keg of nails which had done duty as a specie reserve.

Pontiac, a town founded in the early boom period, leaped into the general expansion frenzy by taking out the State's first railroad charter in 1830. Six years later work was begun on the Detroit & Pontiac Railroad. Presently many a pioneer, upon hearing the first locomotive's distant shriek, was seizing his gun to "git the b'ar" with the strident voice.

The original track of wooden, iron-sheathed rails was soon discharging ripped-off fragments of sheathing through the car bottoms. These "snake-heads," as the flying fragments were called, caused many a casualty among the passengers until the D. & P. came handsomely to the rescue with "a new and elegant car" whose metaled flooring smothered the snake-head offensive.

Michigan's through-rail connection with the East was established by the completion of the Great Western Railroad in 1854.

## TO-DAY IS MICHIGAN'S MANUFACTURING ERA

Nowadays the State's transportation is served by steam lines operating 8,700 miles, motor coaches 7,000 miles, and electric lines 1,090 miles.

When the State's second capital, named

THE FARMING REGION ABOUT KALAMAZOO AND MANTON IS NOTED FOR CELERY

The soil is a deep black muck and the plants grow in long, boarded-in rows. Tourists in the vicinity of Kalamazoo are familiar with the sight of great cartloads of celery being sold on the street corners (see, also, text, page 300).

IN THE STORAGE BINS OF ONE OF THE SAGINAW SUGAR FACTORIES

The beets are loaded into the bins from motor trucks and freight cars, and are conveyed to the slicers and cookers within the plant by water flowing swiftly through sluiceways.

© The *Detroit News*

RAW MATERIAL FOR THE SATISFACTION OF AMERICA'S BIG SWEET TOOTH

Michigan stands with Colorado in the front rank of States producing sugar beets. Her crop approximates a million tons annually, but this figure shrinks

IN FIVE MINUTES THIS PLANT CAN TURN OUT A MILE OF PAPER

The Kalamazoo Valley is among the most extensive paper manufacturing centers of the world. This is one of its largest units and embodies the most advanced ideas in paper-making machinery (see, also, text, page 300).

Photograph by Felix J. Koch

PICKLES IN THE MAKING

Near Onekama is one of the largest pickle districts in the world.

for John Lansing, patriot and jurist, was established in 1848, the legislature found itself in a huge, barnlike structure whose timbers had been hewn in the surrounding forest wilderness. So few were the white settlers thereabout that Indians were enlisted to raise the liberty pole.

But to-day is Michigan's manufacturing era. Her every city, it seems, must make something, and her very capital is not content to make only laws. Lansing has 15,000 hands engaged in industries, mainly the automotive or auxiliary thereto, producing an annual output valued at $185,000,000.

Though Lansing's forests have long since yielded to the spacious avenues radiating from her lawn-surrounded Statehouse, and though the cry for reforesting the State is widespread, the capital and her sister cities rank among the country's most beautifully tree-shaded communities. Sometimes appearing as if buried in greenery, and for the most part displaying regularly spaced maples along foliage-roofed streets, Michigan's towns thus preserve a souvenir of the great logging area of their State.

Michigan's "forest primeval" lay with pine and softwoods mainly to the north of the 43d parallel of latitude, and with the hardwoods mainly to the south of it. A century ago her area was still 97 per cent timbered.

### WHEN THE LUMBERJACK WAS KING

In the expansion period that followed the Civil War the State loomed up as the great pine producer. Eastern farmers turned pioneer and trekked Michiganward for their fractional investment in the 125,000,000,000 feet of timber that rose north of Saginaw. The Prairie States were calling for timber, and Michigan's was massed in big stands with easy river access to the Great Lakes.

Up sprang 800 camps employing 25,000 loggers. Plank roads were laid through the wilderness. In 1875 there were 30 solid miles of logs in the Au Gres. For more than 30 years men chopped and saws screamed, until in 1890 Michigan's pine lumbering reached its peak with 4,250,000,000 feet.

Few indeed are the survivors who can

Photograph by Felix J. Koch

TUNS OF PICKLES

In these huge containers which line a central walk the pickles are set in brine, and as a given lot is desired an attendant with a net dips up the required quantity (see opposite page).

spin tales of tremendous log drives down some spring-swollen river in the sixties. "Great days those," says one octogenarian, "with our drive of 1,400,000 feet of pine logs ready for the ice break-up, and the boss's wife—our cook and the only woman in camp—and the boys eating, drinking, fighting, swearing, and snoring—all in French-Canuck!"

Few remember Silver Jack, the toughest, "swearingest" character in the drive of eighty, and how he wouldn't have his mother's religion insulted by the college graduate who questioned the Savior's divinity, and how Jack fairly throttled him into acknowledging the same; whereupon the whiskey bottle was passed and the camp solemnly drank to Jack's mother's religion.

### GROWING PAINS ACCOMPANIED MICHIGAN'S EMERGENCE FROM HER FORESTS

The lusty pageant of a State emerging from forests into farms is over. In 1924 Michigan's cut, taken chiefly in the Upper Peninsula, was under 800,000 feet, or less than 3 per cent of the national production. Yet above the Saginaw Valley the old logging days have set their ineffaceable mark, inasmuch as most of the towns in that region began as lumber camps and evolved out of that industry.

But the young State's transition period from lumbering to manufacturing was not accomplished without growing pains. Her forests shorn, a host of lumber towns—Ludington, Cheboygan, Bay City, Manistee, Alpena, Muskegon, Saginaw—relapsed temporarily into stagnation or ruin.

The story of Muskegon, sometime the "Lumber Queen" of the west coast, is typical. Her glories fled, her people trekked, and grass grew in her streets. Then slowly she rebuilt herself on the deserts left by vanished sawmills. How the woodworking, automotive, and other industries have lifted the once-ruined town to her present prosperity is one of the most striking stories in Michigan annals.

Saginaw, once such a "Sawmill City" that her shore area was materially enlarged by filling in the shallow lagoons with incalculable tons of sawdust, represents a similar rise, fall, and comeback. To-day she actually pays more in freight bills on her automotive and other products than her famed lumber cut was worth 40 years ago.

WOODEN SHOES ARE AMONG MICHIGAN'S MANUFACTURES

Some years ago one of the many Dutch settlers near Holland made wooden shoes for his neighbors. To-day his sons carry on the business, but make only miniatures, to be sold in souvenir stores and at gas stations.

GIRLS PAINT TOYS FOR THE TOURIST TRADE

At Holland, Michigan, there is a factory which makes toy windmills. This is a new industry, but it is growing rapidly, due largely to the popularity of its products with tourists.

MICHIGAN MAKES MORE THAN NINE-TENTHS OF THE WORLD'S AIR RIFLES

This workman tests the accuracy of the finished rifles in one of the Plymouth plants. He believes he enjoys the unique distinction of having fired more shots from more guns than any other living man, having shot rifles all day long six days per week for 33 years.

A VARNISH SPRAY BOOTH IN A MICHIGAN FURNITURE FACTORY

This new process of spraying paint and varnish on furniture is much more rapid than the old hand-and-brush method. It also produces a smoother and more uniform finish.

THE NAME OF GRAND RAPIDS HAS BECOME SYNONYMOUS WITH GOOD FURNITURE

Probably no other single center in the world exerts so strong and significant an influence upon the furniture trade as does Grand Rapids. The biannual furniture fair brings together exhibitors and buyers from all the States and many foreign countries (see text, page 300). Despite the proficiency of modern machine methods, much decoration is still best accomplished by hand.

Flint took refuge in carriage building. Many a town started diversified woodworking as a stop-gap. Citizens at Ludington, Manistee, and elsewhere bored the earth, produced brines, and made the steam of lumber mills evaporate the brine into salt.

There was a state-wide spectacle of Michigan remaking herself. But not until around the turn of the present century did she set a firm foot on the industrial ladder, up which she has since made so spectacular an ascent.

In 1894 a Detroit citizen had appeared on the street in a veritable gas buggy, with high, iron-tired wheels and dashboard included. Whip sockets occasionally ornamented those early models of the automobile. Indeed, so balky were they that a pair of shafts wouldn't have been amiss.

In 1905 a Michigan manufacturer, who was then turning out 6,500 cars a year, placarded his plant as "the largest automobile factory in the world." That was the first year when, by the startling innovation of a sidedoor, you could make a gentlemanly descent instead of putting your car end-first against the curb, like a patrol wagon.

The State's statistical experts maintain that to-day Michigan is producing approximately 80 per cent of the world's automobiles. The output in 1926 was in excess of 3,200,000 cars.

### FLINT SWITCHES TO "HORSELESS CARRIAGES"

Flint, which in 1904 switched from carriages to "horseless carriages" as an industry, ranks second to Detroit in the State's automotive production (see illustration, page 286).

Her recent history reads as if she had rubbed some industrial Aladdin's lamp. Between 1910 and 1926 the influx of her factory population from Mexico, Canada, and all Europe transformed this town of 35,000 into an industrial beehive of 137,000.

To handle this quadrupled growth, the employers laid out and built an entire suburb comprising 1,000 acres and 1,400 houses. Its charming aspect, its low installment plan of home-owning, as well as the factory workers' clubrooms and technical schools, form a unique object lesson in the enlightened handling of mass employment.

Rather than call the long roll of Michigan's towns which are engaged in the automotive and auxiliary industries, it may be said that 28 towns are so engaged, 187 separate establishments are involved, and their 282,000 employees represent a daily payroll of $2,000,000.

### THE STATE UNIVERSITY HAS HELPED TO SOLVE A BIG PROBLEM

Happily, industrialized Michigan's foreign-population problem is lessened by her efficient system of education. This dates back to the founding of her State university in 1837.

When as yet her territory was a roadless wilderness, there were framed proposals to found "The Catholepistemiad of Michigania." Later this tremendous title was discarded, and to-day, by popular voice, the university has become, simply, "Ann Arbor."

It is negligible whether legend rightly derives that name from the arbor of bygone Mistress Ann Rumsey, for in fact this charming university town is as arboreal as those leafy shades which one associates with Platonic discourse.

Around its 40-acre campus and along the radiating streets are clustered the main buildings devoted to university work. Angell Hall, the Lawyers' Club, with its fine reminiscences of London's Inns of Court; the stately Clements Library, with its priceless Americana from Sir Henry Clinton's archives—these and many another architectural picture, framed among spreading trees, tempt the visitor to return (see illustrations, pages 288 and 289).

Among the first founded of our State universities, Ann Arbor's early success greatly influenced the growth of the state-university idea in the West and Northwest.

Ann Arbor has been coeducational since 1876, and was the first university to admit women to its medical school on an equality with men.

Hillset over the Huron Valley's rolling expanse, and with a student body of more than 10,000, the university is fringed inci-

A CLOUDY MORNING ON GRAND LAKE, NORTH OF ALPENA

Michigan is dotted with thousands of such lakes, which provide ideal settings for summer cottages and palatial residences.

dentally by a town; that is to say, Ann Arbor will always mean a university, as Oxford and Heidelberg connote universities.

With one-half of her land area in farms and two-thirds of this farm area improved or tillable, Michigan in farm acreage ranks just midway among the States.

Her long-established reputation for garden-seed production is protected by one of the most effective of laws and by a staff of seed analysts whose findings are widely published.

Southwest of Lansing the Indian place-name of Kalamazoo ("beautiful water") still holds true by reason of the cold springs which once refreshed the red man and nowadays refresh a muck-land celery crop valued at upward of $2,000,000 (see illustration, page 291).

The same muck region puts Michigan topmost, along with northern Indiana, in peppermint. These two sections produce, for pharmaceutical and other purposes, 85 per cent of the United States' supply.

Kalamazoo's paper factories, which have produced bond and book stock for fifty years, instance how Michigan turned to manufacturing when her lumbering peak had passed (see illustration, page 293).

### MICHIGAN'S GREAT FURNITURE FAIR ATTRACTS THOUSANDS OF BUYERS

Who doesn't love a fair? Who hasn't warmed over narratives of medieval Europe's big sales shows, with their merchants and jugglers and menageries, and cries of "What d'ye lack?" Yet it may surprise some to learn that biannually Michigan stages quite as colorful a fair as ever took place in Europe's marts.

"Come one, come all! There's going to be doings at Grand Rapids next June! Rodeo, opera, vaudeville—what d'ye lack? Bring your wife and family, Mr. Buyer, and incidentally don't forget to glance over our little display of 13,000 pieces of household furniture!" That is about the siren song of the fair's management.

Grand Rapids' furniture market comprises an international aggregation of manufacturers, buyers, and salesmen. From a score of States and from European countries come the displays of furniture and interior decoration. These are disposed on the vast floor spaces of 20

A COW MOOSE BADLY FLY-BITTEN AND ILL-TEMPERED

She came to attack three times, but lost courage each time when the photographer stood fast.

Photographs by Frank M. Warren

A DENIZEN OF ISLE ROYAL

This two-year-old bull moose was within six feet of the canoe from which the photograph was snapped. He was approached quietly up wind while feeding on subaqueous plants.

SUPPER TIME ON THE 200-ACRE STATE GAME FARM AT MASON

These five-months-old fawns, on the propagation farm maintained by the State Department of Conservation, have been secured by game wardens from game refuges in other parts of Michigan. When older they will be distributed to other refuges or to public parks. The appearance of the attendant with a bottle and a bucket of warm milk causes a stampede for supper.

factory showrooms and 10 specially built exhibition buildings. The buyers, of whom 3,000 are sometimes present, hail from every State in the Union and from half a dozen foreign countries.

As modistes go to Paris for style trends, so furniture buyers go to Grand Rapids. Hence, for 20 years far-distant factories have exhibited their wares there, until it has become an international furniture mart.

Its 75 furniture factories, employing 14,000 people, represent an annual products value of $50,000,000. A large preponderance of Hollanders, who still nourish the old craft-spirit tradition, is to be found among the local furniture and cabinetmakers (see illustrations, pages 297 and 298).

But it is between Grand Rapids' environs and Lake Michigan's eastern shore that, as the Dutch folk and their ways be-

A BEAVER LODGE IN ONE OF THE PLEASANT PENINSULA'S LAKES

Various families of beaver have added additional chambers to this lodge until it has assumed the proportions of an apartment house. Its only doorway is below water level, but its sleeping chambers are dry and safe, under the domed roof, which is reënforced by a covering of logs and branches cemented with calcareous mud from the lake bottom.

A DEER HAUNT ON THE UPPER PENINSULA

Once this was a large pine stump, which was salted and used as a lick by the many deer in the Doe Lake Club preserve near Wetmore. The wood still is impregnated with the salt and is gradually being licked away by the rough tongues of the deer, many of whose tracks are to be seen in the sand.

© Frank M. Warren

MANY WILD CREATURES, RARE ELSEWHERE, ARE STILL TO BE FOUND ON ISLE ROYAL

This rugged island in Lake Superior is almost as innocent of civilization to-day as in the centuries past, when trappers paddling by were its only visitors. Its ridges, gorges, and cliffs are clothed with heavy virgin forests of pine, birch, and sugar maple. Large herds of moose and caribou still roam here. The cow moose seen coming ashore has been feeding in six feet of water. When she puts her head down to graze on the succulent vegetation on the bottom, she is entirely submerged (see, also, text, page 312).

come more in evidence, you encounter a delightful surprise.

### A GLIMPSE OF HOLLAND TRANSPLANTED

First you pass acres of truck greenhouses; then you glimpse small-farm methods of cultivation. Finally the sight of green meadows, with herds of speckled cattle dotting the misty, tree-fringed vistas, makes you rub your eyes for the expected concomitant of Netherlands' windmills and canals; for, these excepted, the scene is strikingly Dutch. Moreover, the names of successive towns — Vriesland, Zeeland, Holland—are suggestive.

The Grand Rapids greenhouse region, as part of the State's under-glass cultivation of approximately 6,000,000 square feet, supplies lettuce and tomatoes to the Middle States during those months when such products are normally out of season.

Holland is said to be the largest Dutch settlement in the country. In 1847 its founders, fleeing overseas from unhappy conditions in the mother country, tented on west Michigan's meadows. Nowadays its manufactures amount to many millions of dollars a year. Numerous of its factory hands still speak only Dutch, and until recently the Dutch wooden shoe was made locally for neighboring farmers.

The region possesses one distinctly picturesque industry, that of giving day-old chicks joyrides to farms in distant States. That just-hatched chicks can carry on for two days without nourishment renders it possible to pack them in ventilated cardboard boxes and ship them by parcel post.

In May, 1926, the Holland post office handled 300,000 of what are certainly the world's youngest of long-distance travelers.

### THE STATE HAS A PROFITABLE "RECREATIONAL INDUSTRY"

The automobile circle tour around Lake Michigan measures 960 miles. To this, Michigan's west coast contributes 400 miles of highly diversified playgrounds. These range from sand-dune parks and cove-commanding camps in pine groves to cottage and hotel life on the innumerable inner and outer waters which fringe this wonderfully variegated lake shore.

With fishing, boating, and camping to be found practically everywhere that the Great Lakes wash her shores, coastal Michigan might well be described as the window of the inland Middle States.

Many summer visitors spend their vacations in the free camps which are situated in various of the sixty-odd State parks. The large numbers are mainly due to the automotive development and the parallel development of good roads. Apparently Michigan, so largely responsible for automotive mass production, has won the right to the local phrase which rather quaintly describes this summer touring as her "recreational industry."

### MICHIGAN'S DUNES PRESENT CONTRASTS OF FLOWERS AND DESERT

The west coast's striking sand dunes, extending coastally from the Indiana border to the Leelanau Peninsula and rising to a height of from 50 to 180 feet, might be described as dwarf descendants of the great Ice Age; that is to say, postglacial Lake Michigan's level was 20 feet higher, and at places the shoreline was indented from 30 to 40 miles more deeply than at present. In time the excess water withdrew, the centuries' winds swept the exposed sands shoreward, and these lovely dune lands took form (see page 309).

But one must not slight the claims of Paupukkeewis. Myth lovers will recall that this heap-big terpsichorean created Michigan's sand dunes while performing the Charleston, or some such lively dance, at Hiawatha's wedding:

> "Stamped upon the sand, and tossed it
> Wildly in the air around him. . . .
> Like great snowdrifts o'er the landscape,
> Heaping all the shores with Sand Dunes."

Some of the dunes have stabilized themselves with tree and flower, cedar, juniper, hepatica, ladyslipper, violet, and orchid. Against these the barren dunes wage jealous warfare, often sweeping forward to engulf them, while exposing to rearward a veritable cemetery of tree skeletons.* Yes, the old Indian dancer will still be at his mad antics, and the dune parks at Muskegon and Big Sable Point might justly be named after Paupukkeewis.

Halfway up the west coast the salt works at Ludington and Manistee repre-

* See, also, "Indiana's Unrivaled Sand Dunes," by Orpheus Moyer Schantz, in the NATIONAL GEOGRAPHIC MAGAZINE for May, 1919.

BEFORE GOING OUT INTO LAKE HURON FOR THE DAY'S FISHING

Fishermen of Oscoda are inspecting their nets for rents torn during the previous day's work. In the fall, whitefish and lake trout are caught for the market. When the supply exceeds the demand, the fish are frozen and kept in cold storage.

BOXES OF LAKE TROUT

This Lake Michigan power fishing boat is just in from the morning's work with the nets off Charlevoix (see, also, text, page 312).

A FRENCH TRAPPER'S TWO WEEKS' CATCH OF RED FOX SKINS ON THE TURTLE LAKE CLUB RESERVATION

As the red fox is extremely difficult to catch in a trap, a bag of 30 taken in a fortnight is unusual.

sent a replacement industry which followed the logging era (see pages 310 and 311).

Age-old terrestrial convulsions at a time when some vast sea covered Michigan—these and the sea water's subsequent evaporation, with yet later strata of rock folding themselves over the crystallized salt—account for the great subterranean salt bed which stretches across the Lower Peninsula.

In 1881 a bed 32 feet thick was struck at about 2,000 feet. Michigan, which prior to this time had bought salt from other States, leaped to the head of the industry. In 1895 chemicalizing treatment began, and twenty years later Detroit's factories were producing annually 200,000 tons of soda products.

The pumped-up brine, high in mineral concentration, is evaporated by steam heat, then purified and refined. Michigan now produces 2,000,000 tons of this salt annually for chemical and manufacturing purposes.

In mid-May the west coast's gigantic salt towers overlook one of the loveliest of spectacles, a sea of white and pink blossoms. For 160 miles an unbroken stretch of these enriches the way from Muskegon to Traverse City. On one hand lies the vast lake, with its grotesque dunes, and on the other, orchards shower their "confetti of spring."

Running north and south, this lakeside fruit belt has the advantage of consecutive ripening times, and hence of consecutive marketing periods, which extend over four weeks. Moreover, the relatively cool lake winds retard the buds and decrease the frost peril.

Michigan ranks foremost in small-fruit acreage and leads all States in cherry growing.

### WHERE PRODUCTIVE NATURE WAS SLAIN

Halfway across the State from this joyous blossom belt lies a gaunt region where spring comes in vain to quicken the scabrous, fire-scarred earth. Nine million acres of desolation! Men call them "the cut-over lands"—this haunt of Nature's specter, where through empty eye sockets she stares reproach at man's abuse of her.

A PASSENGER STEAMER LEAVING THE BLACK RIVER, SOUTH HAVEN, BOUND FOR CHICAGO

Caring little, the pioneer logger left "slash" which, burning, killed the young growth. Caring less, the pioneer farmer actually burned surrounding growths as a protection against forest fires. But his Nemesis came, in that the sandy soil rapidly exhausted itself. Then man and his kine trekked, and over the fire-scarred land, which could yield neither crops nor fodder, fell utter silence.

Nature was dead.

Wholesale tax defaultings caused entire counties lying within these lands to revert to the State. These reversions averaged 3,000 acres a month as recently as 1923-1924.

Somewhat more than 20 years ago Michigan started scientific reforestation as the only possible means of restoring these unproductive acres to usefulness. But it is easier to destroy than to recreate, and the present planting rate of 10,000 acres a year suggests a long job ahead for the coöperating forces of Federal and State governments.

The lesson that the State learned from her forefathers' mistakes is now blazoned on her every woodland road in the appeal, "Keep Michigan green!"

From the "little finger of the mitten," at Traverse City, and northward alongshore, the scenic wilderness intensifies. The multiplying white birches seem to whisper of legendary times. At last the six-mile strait and the whole glorious region of Michilimackinac—the tips of two peninsulas and the junction of three inland seas—sweep into view.

### A FOCAL POINT OF HISTORY, LEGEND, AND ROMANCE

Here focus history, legend, and romance. China-hunting Nicolet passed this way. Yonder is St. Ignace, founded by Fathers Marquette and Dablon. Heroic La Salle canoed these waters. Against the horizon rises Mackinac Island, from whose now-vanished fort Cadillac once commanded the strait. And, if ghosts could sing, you would probably hear the paddling ballads of the *coureurs de bois,* those wild boatsmen-woodsmen, half French, half Indian, who, in their fur-heaped canoes, still seem to haunt the scene.

Michilimackinac means "the great turtle," and refers to the shape of the beautiful island which the French called Macquina. Nowadays 1,000 or more summer

THE SAND JUMP AMONG THE MICHIGAN DUNES

All the fun of "falling a mile" without the danger of "stopping so quick."

Photographs by George R. Fox

HOW THE DUNE MOVES ONWARD

The front of this sand wave has advanced more than 40 feet in five years. It is pushing forward on three fronts, engulfing trees and shrubbery in its irresistible march (see text, page 305).

© The *Detroit News*

MINING SALT ON THE RIVER ROUGE, NEAR DETROIT

Michigan owes her salt deposits to a great inland sea that occupied her present area some millions of years ago. Only after lumbering had ceased to be a bonanza did her people turn seriously to mining their saline wealth (see, also, text, page 307).

tourists are driven daily through its fairy-like woods.

Motorcars being prohibited on Mackinac Island, only the sleepy sounds of "Whoa!" and "Giddap!" disturb its woodland glades. Gasoline belongs to another century than that from which the island draws its mellow charm.

So you rejoin your car at Mackinaw City, ferry it across to St. Ignace, and find yourself in the Upper Peninsula.

A 400-mile drive from St. Ignace to Ironwood leaves one impressed by the Upper Peninsula's dimensions and contents. Indeed, lower Michigan was similarly surprised when, early in the nineteenth century, she began investigating this territorial award.

Following the dispute of 1835-1837 with Ohio over the so-called Toledo strip, Michigan reluctantly accepted the Upper Peninsula by way of compromise.

This legislative postscript to the newly erected Michigan proved to be larger than any one of seven Atlantic States. Contributing 30 per cent of the State's total area, it enlarged her total land surface to 57,480 square miles and advanced her area rank to 21st in the Nation and to second east of the Mississippi. It increased her coast line to the longest among the States. It gave her a maximum length which is

STORAGE ROOM IN THE SALT WORKS AT MANISTEE

The salt is refined from brine pumped from wells more than 2,000 feet deep. It is brought into the storage room on an overhead belt which deposits it in piles. This is the coarse grade, which is sacked and barreled for the packing-house trade.

best conveyed by saying that a circle centered on Detroit and described with Keweenaw Point as a radius will overlap Ottawa, Canada, Utica, New York, Washington, D. C., Bristol, Tennessee, and Cedar Rapids, Iowa.

### NEWBORN MICHIGAN RECEIVED FABULOUS COPPER GIFT

Drive on from Ironwood to the Keweenaw country and you will be amazed by the mixture of wild scenery and economic wealth; for in the Calumet region, clustered on the fringes of a virgin forest 15 miles in breadth, lie some of the world's most valuable copper and iron mines. These mines constituted the "legislative postscript's" second surprise for newborn Michigan.

In 1842 James K. Paull discovered a huge bowlder of copper in the Ontonagon River. There followed the fame of the Calumet and Hecla lode in the Keweenaw and a copper output which is reckoned at seven billion pounds to date.

In 1845 Marji Gesick, a Chippewa chief, found at Ishpeming a lump of iron ore under a fallen pine. It was the forerunner of a high-grade ore output from the Marquette, Menominee, and Gogebic ranges. Usually reckoned at thrice the output of Sweden and equaled only by that of Minnesota, it varies between 12 and 15 million tons a year.

The early fame of Michigan's mines spread overseas, and thousands of Cornishmen immigrated to the Keweenaw. To-day an occasional "Cousin Jack" or "Cousin Jennie," as the Cornishman and his wife were generically known, can still be found to relate their childhood memories of Michigan's great mining boom.

You never know your luck. Michigan, whose thirty-odd mineral products are to-day valued at $122,000,000 a year, had yielded the Toledo strip and gained, instead, the basis of her future preëminence. But for the Toledo compromise she would not now rank among the Titans of the metal-using industries.

Copper Harbor, which lies adjacent to some of the Keweenaw's gemlike forest lakes, hints by its name that you are still on the trail of the red metal. It is a route

BLOCKS OF COPPER AWAITING SHIPMENT FROM HOUGHTON

These ingots are made of ore from the Keweenaw Peninsula, "the copper country" (see, also, text, page 311). The city of Houghton and Houghton County took the name of Douglas Houghton, State geologist, who first determined the vast mineral wealth of the district. One mining company alone has paid more than $40,000,000 in dividends.

which will lead you across Lake Superior to Isle Royal; for it is there that Michigan's copper history finds its roots in legend and myth.

### RADISSON FOUND THE "FLOATING ISLAND OF COPPER"

About 1665 Pierre Radisson crossed Lake Superior, located what Indians had described as a floating island of copper, and learned the legend associated therewith. This told of how, long ago, a strange people had come repeatedly to the copper island until the enraged Indian sea god had foiled their pilferings by causing the island to wander eternally on the "Big-Sea-Water."

Latter-day discovery has revealed on Isle Royal and its surrounding archipelago many small copper pits with numberless stone hammerheads scattered around them.

Whether or not these prehistoric miners were Indians remains unknown. They left behind them no mound, burying place, or other clue. Their method was to heat the rock, dash water on it, and hammer out slivers of the metal. Discovered caches of copper suggest that they carried it southward via the Keweenaw and Sault Ste. Marie.

To-day Isle Royal is almost as virginally wild as when its mysterious miners labored there. Its 200 square miles of rugged ridges, deep gorges, and profiled cliffs are massed with a veritable "forest primeval" blazed only by wild animal trails. It is estimated that 2,000 head of deer, moose, and caribou roam there, and the island's familiars say that beavers work along its various streams (see pages 301, 303, and 304).

A census taker visiting Isle Royal out of summer season would find business very poor; for, the lighthouse men excepted, this remote outpost of the State's fishing industry would be uninhabited.

Nineteen fish species, principally lake trout, whitefish, and lake herring, form the State's annual catch, which some years amounts to more than 10,000 tons, valued at more than a million and a half dollars.

While a prosperous agriculture comprising more than 12,000 farms has developed in the Upper Peninsula, lumbering

TOMBSTONES OF A DEPARTED INDUSTRY

These ruins near Marquette mark the site of an old iron furnace which went out of blast 20 years ago. The cone-shaped roofs have fallen in.

constitutes its main industry. It is estimated that four-fifths of Michigan's standing timber is located there, and that at the present cutting rate the logging camps have still 40 years' work ahead of them.

As befits this "land of the Ojibways" and these "shores of Gitche Gumee," the peninsula retains in its massed forests and beautiful lakes a remote and romantic charm. It is a fitting haunt for such Indian demigods as Hiawatha and such epic woodsmen as Paul Bunyan.

### "TALL" TALES AMID TALL TIMBERS

Visit any Upper Peninsula logging camp and you will find that the apocryphal Paul and his "blue ox, Babe," still live in tales as "tall" as the surrounding timber. Some say that Paul had his prototype in some gigantic French-Canadian lumberjack who participated in the Papineau Rebellion of 1837. Certainly by 1860 he had become a legendary hero whose Herculean exploits are known in Michigan, Washington, Oregon—wherever loggers foregather around the camp stove.

Paul, as a baby, tossed so tremendously as to prostrate 40 square miles of standing timber. Arrived at man's estate, he had his boot heels pegged with his initials, so that, when drunk, he could kick "P. B." into the rafters of ceilings eight feet overhead.

"Blue Babe" took on her peculiar hue by being left out in the famous blue snow. As she could walk only on ice, Paul sprinkled the snow with a gigantic hose, the leaks in which caused Niagara Falls. Babe's most famous exploit was being hitched to an 18-mile road with 16 hairpin curves, and hauling it straight.

The cycle of Bunyan tales is endless. Invariably they are related with a profound seriousness and an aping of truth by burlesque exactitude. For instance, Babe didn't "pree-cisely" measure 42 ax handles between the eyes, because "you could easy fit in a Star tobacco box after the last handle." Invariably, too, the narrator once knew Paul, or courted his daughter, or logged with him "where the Little Gimlet empties into the Great Auger."

Photograph from Melville Chater

THE YOUNGER GENERATION OF MICHIGAN STOCK RAISERS: MEMBERS OF A COUNTY CALF CLUB

Although this State has become an industrial Titan, she still maintains extensive and important agricultural interests. Many of her boys and girls from the farms are organized into clubs for instruction in more efficient and scientific methods of producing bumper crops and high-grade live stock.

Similarly, Hercules lore may well have originated among "tall talkers," who were merely showing their fellow Greeks a good time. Indeed, Paul is cousin-german to both Hercules and Thor. He is a genuine North American demigod, born among the toils and rough humors of the logging camps.

### THE WORLD'S GREATEST BODY OF FRESH WATER

As for the Ojibways, what with inexhaustible supplies of metal and canoe materials at hand and the world's greatest fresh-water body at their doors, they might have founded a lake empire.

Lake Superior exceeds Lake Victoria, in Africa, its nearest rival in size, by about 5,000 square miles. Its shore line of 1,500 miles is longer than the air-line distance between Canada and the Gulf of Mexico. Its maximum recorded depth is 1,008 feet, and if its surface sank 602 feet it would then be at sea-level, with plenty of water left to float the world's navies.

The "last of the Ojibways" may still be found at various farming and fishing settlements in Chippewa and Baraga counties. Michigan's Indian population slightly exceeded 5,600 at the last census. At L'Anse you may still see the old Chippewa cemetery, with crude shelters erected over the graves, according to the burial custom witnessed three centuries ago by the Jesuit Fathers.

From Indians to industrialism is a far step. Hiawatha's appeal to the forest trees for raw materials wherewith to build his canoe is nationally famous; but were Hiawatha

THE WEST SIDE OF PRESQUE ISLE PARK, NORTH OF MARQUETTE

Many deer, secure from hunters, live on this island and are fed by game wardens during the severe winter months.

THE ARCHED GATEWAY OF THE SALLY PORT IN THE LOWER WALL OF OLD FORT MACKINAC

The statue in the park below is of Father Marquette, one of the French Missionaries of the 1670's (see text, page 276).

alive to-day, he would probably sing, "Give me of your wood, O Forest," and, "Give me of your ore, O Mine Pits," to the end that:

"I a motor car shall build me,
Build a limousine for touring."

And, instead of paddling "down the rushing Taquamenaw," he would probably invoke that stream to furnish hydroelectricity.

### THE WORLD'S GREATEST INLAND WATERWAY

Michigan develops from her major water-power plants more than 300,000 horsepower; but that form of power contributes, according to high or low river levels, only from a fifth to a third of the total horsepower needed.

The Sault contains in St. Marys Falls Ship Canal what has been termed the world's greatest inland waterway. Its passing ships constitute so mighty a pageant that the "Soo" locks might be described as the grandstand of the Great Lakes (see illustrations, pages 318, 321, 323, and 324).

In the now greatly diminished rapids the Ojibways speared "the deer of the waters"—*i. e.*, the whitefish—centuries before Frenchmen called the place the Sault,

Photograph by Felix J. Koch

A CORNER TOWER OF THE OLD FORT AT MACKINAC ISLAND

This stronghold was once termed the Gibraltar of America because of its strategic position between Lake Huron and Lake Michigan. It was built by the British in 1780 and relinquished to the United States in 1796 (see, also, text, page 308).

OLD INDIAN GRAVES IN THE CEMETERY AT DOLLAR SETTLEMENT, NEAR BRIMLEY

The wooden covers are for the protection of food, tobacco, etc., formerly brought to the graves by relatives of the departed. This custom has been discontinued. The cemetery is one of a scant few remaining in Michigan to-day.

"THE MARINE PARADE"

For eight months a year there is a continuous procession of large vessels on the St. Marys River below the "Soo."

THESE BELLS SUMMON THE VISITORS TO "CHAUTAUQUA"

During the summer their clarion tones announce the meetings of the Chautauqua, or "Assembly," at Bay View, a suburb of Petoskey, overlooking Lake Michigan.

THE SPORT OF HUNTING WITH THE CAMERA INSTEAD OF WITH THE GUN WAS ORIGINATED IN MICHIGAN

In this State a citizen of Marquette, George Shiras, 3d, made the first wild life photographs more than 40 years ago. Later he originated night photography of wild animals. As a member of the United States Congress, he wrote and introduced the original bills putting under Federal control migratory fish and migratory birds, which latter measure, known subsequently as the Weeks-McLean bill, became a law March 4, 1913. This act is the most important bird legislation ever enacted for the benefit of sportsmen, nature lovers, and agriculturists. It has brought about a rapid restoration of our mallard, canvasback, and other game birds which had been almost exterminated. See "The Wild Life of Lake Superior," "Photographing Wild Game With Flashlight and Camera," "Wild Animals That Took Their Own Pictures by Day and by Night," "One Season's Game-bag With the Camera," etc., by George Shiras, 3d, in the NATIONAL GEOGRAPHIC MAGAZINE. This picture shows Mr. Shiras holding two pairs of moose antlers interlocked, which he found on St. Ignace Island, Lake Superior. Each is of 50 inches spread, so inextricably joined in the deadly rivalry of the mating season that both contestants were vanquished forever.

or Falls, of Ste. Marie. There, in 1797-98, the North West Fur Company constructed a lock large enough to take canoes; yet the region was so uncomprehended that in 1840 Henry Clay characterized a proposal to canalize St. Marys River as "a work quite beyond the remotest settlement of the United States, if not in the moon."

GREAT LAKES INDUSTRY HAS DEVISED NEW METHODS OF LOADING SHIPS

One of the finest ore loading docks on Lake Superior is at Marquette. Big freighters come here from lower lake points, and ore deposited in the overhead bins from the dump cars of the ore trains runs from the spouts into the holds of the boats below. In this manner a ship of 14,000 tons has been loaded in 16½ minutes (see, also, text, page 325).

LEVIATHANS OF THE LAKES MEET AT THE SAULT

The great ore ships that carry iron and copper from the Mesabi and Menominee ranges all pass through the locks at Sault Ste. Marie. The tonnage recorded at the Panama and Suez canals is far surpassed by that which is handled here (see text, page 325).

Photograph by A. E. Young

FREIGHTERS CAUGHT IN THE LAKE ICE

The ore and grain boats that make up the large fleet of freighters plying the Great Lakes are of a type well adapted to withstand the severe storms which frequently lash the "inland seas" into a fury. They weather these storms without assistance, but when winter seizes them in its icy grip they have sometimes to be very literally "tugged" out.

Photograph by A. E. Young

LOWERING A PASSENGER STEAMER FROM THE LAKE SUPERIOR TO THE LAKE HURON LEVEL, A DROP OF ABOUT 20 FEET

The gates behind the steamer having first been closed, the valves of the lock are opened and the water gradually flows out through the bottom and into the fore bay. When the level of the water inside the lock reaches that of the water on this side of the foreground gates, they will swing open and the ship will be ready to continue its journey on the Huron level. Sault Ste. Marie (see, also, page 324).

© A. E. Young

VIEW FROM THE AIR OF THE WORLD'S TWO LONGEST LOCKS: SAULT STE. MARIE, MICHIGAN

During the past five years, freight valued at more than five billions of dollars has passed through these locks. They are the channels through which the untold mineral riches of Lake Superior's shores and much of the golden grain of western Canada are distributed to the world (see text, page 325). What remains of the rapids may be seen in the background, and beyond is the Canadian shore.

When, in 1853-1855, American engineers harnessed St. Marys Falls as lifting power, they outraged all precedents by building two locks in tandem, each 350 feet long and 70 feet wide, with a 9-foot lift.

But in 1881 these were outstripped by the Weitzel lock, 515 feet in length and 80 feet in maximum width; and 15 years later this was in turn outstripped by the Poe lock, 800 feet long and 100 feet wide.

Finally, 1919 beheld the Sault banded by the world's two greatest locks. These have a usable length of 1,350 feet (thus exceeding the Panama locks by 350 feet), a width of 80 feet, and they carry a depth of 24½ feet of water.

Locks? Say, rather, the keys that unlock economic wealth! Of iron, copper, grain, and other commodities, more than 90,000,000 tons, valued at about $1,250,000,000, have been "unlocked" on St. Marys Falls Ship Canal in a single eight-months' season. In general, the Sault's annual traffic greatly exceeds that of the Panama, the Suez, the Kiel, and the Manchester ship canals combined.

Conservative computation shows that, after deducting operating costs and interest on the investment, the Soo canal system has saved in freight charges in one year nearly $90,000,000. And while, in fact, all vessels have passed toll-free ever since its transference to the Federal Government, in 1881, one may estimate its annual cost at under four mills per freight-ton handled.

In view of the Northwest's vast grain contributions and realizing that the Lake Superior region furnishes more than four-fifths of our iron ore, one perceives that any catastrophe befalling the Soo locks would reverberate economically through the East and even across the Atlantic. The iron-using trades would be paralyzed, armies of factory workers would be laid off, and England would experience a serious diminution in American flour. As to the consequent glut of commodities, 25 railway tracks to the seaboard and freight cars by the tens of thousands would be needed to cope with it.

Departure from Michigan by a freighter at the Sault makes one's farewell view of the State a truly impressive one. Indeed, you are doubly in luck if you can secure such accommodation. What is called "personal service" is magnificently eclipsed when some friendly official says he will ship you on the finest vessel passing that day. It means you will have your pick of 75 ships, for that is the average number clearing the locks every 24 hours.

While waiting, you watch the extraordinary sight of great vessels, inclosed in parallel locks, playing at slow-motion see-saw, as they rise or descend on their respective ways to Lake Superior or Lake Huron. Then one, which but just now looked as high as a house, sinks imperceptibly to the quay and you climb aboard.

Some 750 main vessels, or 1,200 in all, form the Great Lakes freight fleet. Nine of the biggest of these, lying stem to stern, would extend a mile. An ore carrier's cargo runs to 15,000 tons, and the loading of this is indeed a speed spectacle. Shot from pockets, through spouts, and into the ship's hold, a cargo of 14,000 tons has been loaded thus in 16½ minutes.

As your vessel drops down to Detroit and thence out upon Lake Erie, there is ever along the horizon some faint plume of smoke which tells of those tireless carriers, which, by day and night, through calm or storm, silently pursue their tasks in the work of national development.

### MICHIGAN'S HISTORY IS INSEPARABLE FROM HER LAKES

If you would understand Michigan, arrive and depart by water; for the Lakes are inseparably bound up with her history, her development, her future. Between Monsieur Nicolet's arrival in Michigan and to-day, when industrially she ranks third or fourth among our States and produces yearly more than four billion dollars' worth of manufactures, there lies an economic development which would have stunned the China-hunting Frenchman's comprehension.

Reflecting on this, one wonders anew what symbol, better expressive of her progress, should replace that of the mitten.

Reach or leave Detroit by water, and your first glimpse, your last memory, is of its slim, towering stacks, grouped in fives, etched against the sky. They are like the upward-reaching fingers of some colossal hand. And perhaps that is the State's truest symbol. Michigan has stripped off the lumberjack's mitten and reveals the giant hand of industrial achievement.

# ARTIST ADVENTURES ON THE ISLAND OF BALI

By Franklin Price Knott

*With Natural Color Photographs by the Author*

"WHAT with snakes, jungle fever, and nice striped tigers that dote on artists, you'll not get many pictures. Besides, rainstorms in the Dutch Indies last forty days and nights, and it's hotter there than the middle kettle of Hades."

With such serio-comic banter California friends heard my plans to sail for that Enchanted Isle of Bali, away over in eastern seas.

In every man's dreams there is always one favorite spot, somewhere, that he hopes some day to see. It may be a country itself; it may be its people, its great cities or art treasures; it may be but the primordial urge to fight for the sheer adventure of it—to seek romance in strange lands. But, some time in his life, the man of any imagination feels the call to far places. So it came that I went to Bali, that beautiful but little-known island of flowers and modern Eves, lying off beaten tourist trails, east of Java.

### THE MAGIC OF AUTOCHROMES MAKES THE ARTIST A GEOGRAPHER

For years I was a painter of miniatures. Faces, beautiful and dull, ugly and interesting, passed before my brush.

Then came the magic of autochromes. By color photography, millions who read this magazine may glimpse the glories of Nature—God's own great studio. Like an artist's brush, now the camera catches every tint and shade from Arizona desert or Alpine sunset to the gorgeous panoply of Indian rajah courts and the bronze beauty of jungle maids asplash in lotus pools.

So it came I laid down my brushes and took up the color plates. And from the Ganges to the Great Wall, from Pyramids to Buddhist temples, I have wandered. To catch their color and portray these dream places to the millions here at home who long to see them—that, now, is my avocation.

It was tropic dawn—the soft, soothing, hazy dawn of a calm East Indian day—when we anchored off Buleleng, the town of many natives and a few Dutch on Bali's northern coast.

Brown men in a small boat took me ashore through blue-green surf; then set me down with my bags alone on the beach. It is a hybrid, palm-shaded town, part Dutch tin roofs and part the thatched huts of natives, this Buleleng, the first point of contact between an encroaching outer world and long-isolate Bali. But no hotel runners, no cab or taxi men leaped at me from the coconut groves. The island, as yet, knows them not. In fact, nobody paid me the slightest attention.

Half nude women, market-bound, marched by in stately parade, burdens on their heads. Lean dogs filed along, each intent on his own affairs. There passed a man with a red rooster tucked under his arm, and two small boys lugging a grunting sow in a wicker cage. But not one of them even looked at me. On Bali I was to learn that "mind your own business" is an unwritten law.

In fact, I might be there yet—alone on that Bali beach—had not a friendly white man, Andre Roosevelt, suddenly appeared. He was the one and only American living there, and he spoke the island tongue.

"Till you find shelter," he said, "I can put you up."

### WHERE BIRDS TALK AND BUTTERFLIES FLY LIKE BIRDS

"Bali is a peculiar place," explained my host later, over our breakfast of bananas and rice. "Here books are bound from tree leaves. Religion is the chief occupation. Trial marriage usually takes. It's a land of the slimmest women and the fattest pigs. Birds talk and butterflies fly like birds. Praying to pagan gods and fooling pagan devils are the main pastimes. Tourist attractions are many, but

tourists few. Our island lies hard by the big path of round-the-world trippers, yet few see it—or even hear of it.

"It's a social and sociological curiosity, this island of Bali. Its natives are what biologists might call 'sports' in East Indian ethnology.

"It lies a night's cruise east of Java. It's about 90 miles long, with a 10,500 foot peak and more than a million peaceful, polygamous people. Its women are the fairest in all Malaysia—and a dressmaker would starve."

### BALINESE BEAUTIES PROVE CAMERA-SHY

Happily, aided by my host, I found John, a Bali boy interpreter. A willing young guide he was, mixing Dutch with broken English and Malay, only to break out in voluble Balinese when excited. "You make picture? *Gewis!* I show you temple, flowers—and much purty girl."

But, as a diplomat, John's work had lumps in it. Time and again I glimpsed a pretty face and wanted to photograph it, only to have the girl run away when John asked her to pose.

There was one girl in particular on that island, a veritable Venus—straight, slim-limbed, graceful as a deer. Often I got fleeting glimpses of her. Sometimes she would be bathing with other girls in a wayside pool, or walking sedately to the temple with an offering of fruit or flowers. Time and again I sought to take her picture, but caught only the flash of her dazzling smile as she flitted swiftly away. In vain John pursued her. He might as well have shouted at a shy bird of paradise!

As John and I worked our way across Bali, toward its south shore, I was amazed to see how densely peopled it is, and how intensely tilled. Coco palms and tamarinds sway over the paths and rice fields are everywhere, even terraced far up the hillsides, as in Java, Japan, and the Igorot country.

The quest for photographic adventure along these island paths, past green fields, temples, and walled villages, is an endless delight—unless a carabao suddenly flounders up from the mud to chase the white man. Bali children ride these clumsy creatures, and even when one runs amuck it is said a small boy swishing a switch through the air may cause the mad beast to turn aside in his charge. But here, as in the Philippines, there seems to be something in the looks or smell of a white man which the carabao doesn't like.

Once I sat for hours beside a pool, where carabaos lay half-submerged in a cooling siesta, waiting for the beasts to lumber out, so that I might photograph them. Once or twice I threw clods and yelled, trying to make them come ashore. But, with their sweeping horns and black faces level with the water, they only stared and emitted long, sighing grunts. Finally, in despair, I "shot" an ancient winebibber who came along the path, carrying two jars of the palm wine which Bali drinks when it "throws a party." (See Color Plate VII.)

Odd drippings of gum, looking like icicles, hung from a tree beside the path, as I walked back to the village, and from a wayside pool several girls, interrupted at their afternoon bath, scrambled out and ran away, carrying their scant sarongs, at my approach. "Wing shooting," so to speak, would have been my only chance for a picture here; but autochromes are not adapted to moving subjects.

Such butterflies as one sees in Bali! Orange and white, black and yellow, or black and green, and huge purple ones, all flying like birds, not fluttering, as ours do. And there were wild chickens in the woods, the cocks brilliantly colored, and a talking bird they call the beo, a black, sluggish fowl with dangling yellow wattles—an ugly thing, like a wattled old woman.

### THE PIGS OF BALI ARE CURIOSITIES

The Bali village is a group of kampongs or compounds. Each surrounds several little houses and a few smaller structures used as granaries and built high to save the grain from pigs and rats. One house may shelter several families. Usually the Bali hut itself is a small, nipalike, thatched affair, with a frame of poles. A few feet above the ground is a platform, where one sees the family lying around at ease during much of the day. But whenever I approached one of these family groups with my camera, the members of the household would roll off the platforms and sidle over to the next house.

The Bali pig is a physical curiosity—like a dachshund with a pig's make-up. Even in infancy his tummy almost drags on the ground. In youth he has no youthful figure. He is "underslung," so to speak, and could never travel a road with "high centers." The older he gets, the bigger his waistline. And his back sags like that of an old family nag ridden when too young.

Bali, too, is the land of big noise. There's no brawling, but if it isn't the native orchestra, it is the roosters that keep up the racket. They crow by the thousands, long before day. Before they quit, the pigs begin to squeal—not from hunger, for they're all fat. Foraging in the cool of the morning or lying in midday shade, I heard them testing their squealers. They seem to want to tell the world that here no Moslem prejudice against pork can cramp any pig's style or restrain him from self-expression.

I saw these Bali pigs, each in his own wicker cage like a prize bird, being loaded on ship for export to Singapore. The deck was piled five tiers high with the fat, waddling creatures, whose squealing chorus almost drowned out the ship's siren.

Here pork is the only meat eaten. Cattle are raised, but for export. Big, brown, beautiful creatures they are, with a singular white patch on their hind quarters. Seen from behind, they look as if they were wearing white pants. I was told that at times the bulls figure in a religious ceremony and are decorated with big bells, but I saw none of this.

### GRACEFUL WALKERS BEAR HEAVY BURDENS ON THEIR HEADS

Everywhere I met streams of people walking, walking—and always carrying something on their heads. If it wasn't a half-nude girl with a 50-pound temple offering of fruit and flowers balanced on her head (see Color Plate I) it was a small boy balancing an empty bottle there, or a man with a bundle of sugar cane, a basket of rice, or coconuts, heavy enough to make any union porter in America rub his shoulder and ask for another two bits.

During the years when I painted, I knew many famous models in American and European art centers, but I recall few specimens of the human race so easy to look at as the beautiful women of Bali. Erect, slender-limbed, small of wrist and ankle, with tapering fingers, and long, wavy tresses falling over a smooth skin nearly white or light bronze; with perfect, even teeth and a singular grace and dignity of carriage, they have few physical equals among womankind.

### A BALINESE DRAMA IS CHIEFLY SPECTACLE

Strolling one afternoon through a shady coconut grove, I heard the marimbalike rumble of the gamelan, or native orchestra (see Color Plate III). Guided by its hollow drumbeats, I came presently upon a crowd of natives squatting about the sylvan stage of an open-air theater.

Though the girl players' words were as Comanche to me, from their gestures and pantomime I caught at bits of plot in this Balinese drama.

But it was the spectacle itself—the gorgeous golden gowns and ornate headdress of the Bali showgirls, the graceful, symbolic measures and postures of their ancient dance—that enthralled me. The training of these girls begins at the age of five; at 12 or 14 they cease dancing and return to village life.

Here the play's the thing, and all over the island the drama and the dance go on throughout the year. But a playwright would starve; and no "new steps" are ever introduced by Bali dancing girls. Here there's never a "first night" nor a new show. To-day Bali enjoys the same songs, dances, and drama it knew centuries ago, all based on island folklore, mythology, and historical legends. Yet nobody seems bored. Even the children know the lines and songs by heart; they follow the players' every word and gesture with close attention.

Such demons as ruin the rice crops or bring disease to carabao, and the demigods who have influenced the lives of the Balinese through the centuries, figure in the songs and drama.

Shows are usually given in the daytime, against a temple or a natural back drop of jungle green.

When one performance was over, my interpreter sought the headman of the near-by village where the dancing girls

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Autochrome by Franklin Price Knott

FOOD FOR THE GODS IN BALI

Suggestive of a Chinese New Year's cake—or the stage crown of a musical comedy king—these Bali Island temple offerings of fruits and flowers are gorgeous to look upon. These gifts frequently weigh from 50 to 125 pounds. Yet the strong, straight-backed Bali maidens easily carry them on their heads, walking five or ten miles along bamboo-shaded jungle paths to reach a favorite temple.

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Autochrome by Franklin Price Knott

WITH DANCE AND SOUNDING BRASS THE BALINESE PRAISE THEIR GODS

In gold-leaf gowns and ornate crowns, Bali dancing girls perform their rhythmic steps. Here most dancing is still a form of religious expression. Flanked by two grinning idols in the rear rank, stand the masked priests, who trained the girls. Among them, with mustache and regal bridelike finery, is the village headman who staged the dance for the photographer.

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DRUMS AND XYLOPHONE-LIKE INSTRUMENTS COMPOSE THIS BALI ORCHESTRA

On a still night, the thump and murmur of the *gamelan*, as the band of from 10 to 17 men is called, may be heard for an astonishing distance, through the hushed jungle lanes.

TWO DANCING STARS OF BALI

In step, time and posture, the Bali dances resemble somewhat those of Siam and Cambodia. Almost from infancy, the girls are rigorously trained, and they usually retire to village life after the age of 12. The average religious dance lasts from 40 to 50 minutes.

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BALI HAS NO BLONDES

These 17 girls, chosen at random without regard for caste, from a near-by village, are average examples of Bali's erect, well-formed womanhood. They are of a light bronze color, and have straight or wavy dark hair.

COSTUMED FOR THE SACRED LION DANCE

The priest on the right might well be signaling for a manicure. Long finger nails are worn by some of Bali's holy men. With these long nails, and their supple wrists and fingers, they form strange geometric figures in the air as they sit cross-legged at their prayers.

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A LION, AS CONCEIVED BY BALI ARTISTS

The Balinese take their ceremonial Lion Dance quite seriously. Supported by two priests, the effigy is made to wiggle its false tail, shake its mane, and cavort grotesquely about on its paws of bare human feet.

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A YOUNG BALI ACTRESS, MADE UP AS A CROSS-EYED BOY

This child performer is the most accomplished actress on the island. Here, with the golden kris, turban and hand-woven gown covered with gold leaf, she is costumed for a male warrior rôle in a popular mythological play.

BRINGING IN THE SHEAVES

Young green rice in the foreground, a standing crop beyond the man, and harvested rice sheaves on his shoulder, form a composite picture of this valuable grain in three stages.

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BALI'S CHIEF BEVERAGE IS PALM WINE

In all island markets, this bitter, potent drink is sold by the cupful, from earthen pots such as these. Yet on Bali one seldom sees a drunken man. The island's most harmful vice is the abuse of opium.

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THE FACES OF PAGAN GODS ARE USUALLY CRUEL AND UGLY

Masks worn by the two priests are copies of the faces of graven images found in Bali temples. Foreign artists visiting this island are amazed at the originality of design revealed in some of these grotesque, sculptured idols.

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JUNGLE MAIDS IN REGAL FINERY

Ordinarily, village children romp half naked around the shady paths and pools of their island home. Only on fête days do they don these gowns and crowns to participate in the ancient ceremonials (see also Color Plates II and IV).

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COCKFIGHTING IS A FAVORITE DIVERSION WITH THE TIRED BUSINESS MAN OF BALI
(SEE ALSO COLOR PLATE XIII)

© National Geographic Society Autochrome by Franklin Price Knott

EVEN THE CAMERA COULDN'T COAX A SMILE FROM THIS RESERVED AND DIGNIFIED DAUGHTER OF THE EAST

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ONCE BALI MADE ALL ITS OWN SARONGS; NOW, CHEAP ONES ARE IMPORTED FROM EUROPE

Formerly this simple piece of cloth, in beautiful designs, was the only garment worn on the island. Now, with the encroachment of civilization, shirts, jackets and even shoes are beginning to appear.

Autochromes by Franklin Price Knott

LIFE IS SIMPLE ON BALI, AS IT WAS IN EDEN AFTER ADAM AND EVE WENT TO WORK

The island knows no fancy package foods, no delivery wagons or community grocers—just a well organized farming system where both sexes labor to provide food.

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Autochrome by Franklin Price Knott

THE NATIONAL SPORT

Next to his children, a fighting rooster with many victories to his credit is the most prized possession of the Balinese. Snug in their neat wooden cages, these birds are carried proudly about the village streets by their owners. When one favorite is pitted against another, the betting is very lively.

© National Geographic Society Autochrome by Tassilo Adam

THE JAVANESE PRINCE, MANGKU NEGORO VII, AND HIS CONSORT, RATU TIMOR, OF SURAKARTA, JAVA

Though now differing widely from the Javanese in many ways, the culture and religion of Bali, like that of its larger island neighbor, came originally from the Hindus.

© National Geographic Society

Autochrome by Tassilo Adam

A SCHOOL IN EMBROIDERY

Eventually, no doubt, the Dutch who control Bali will introduce and develop industries here, as they have in other parts of the Dutch East Indies. This school was started by the native wife of a Dutch official of western Sumatra. She stands at the left.

© National Geographic Society Autochrome by Franklin Price Knott

THIS 9-YEAR-OLD GIRL IS BALI'S CLEVEREST DANCER

Under her gilded crown, with her ornamental fan and gown of gold leaf hammered on silk, she stands for fashion's ultimate expression among the juvenile entertainers of her show-loving island.

lived. He agreed to have them pose in costume for me next day (see Color Plates II and IV).

### RELIGION PLAYS A MAJOR RÔLE IN THE LIFE OF BALI

Hindu temples, big and little, cover this thickly inhabited island. Moslem immigrants have come over from Java, of course, and I saw many Chinese proprietors of shops where even American-made hand sewing machines were on sale; but I could not see that either Cross or Crescent had gained much foothold on Bali. One singular story is told of an early Christian missionary who, after long efforts, finally made one Bali convert. But this native apostate, thus cut off from his kind, finally turned on the missionary who had made him a social outcaste and killed him.

Even the most humble hut usually has its own little "house temple"—a crude, primitive structure of wood and thatch, with its simple offerings of cut flowers and rice.

Religion is everywhere in Bali. It seems to inspire all work and play. I saw no one who seemed lonely; no beggars, no drunkards, no prostitutes. Every act is service to the temple gods; every spot is holy, and every peaceful hour seems sanctified to daily life. Here the external and spiritual world are closely akin.

No hill, no stretch of beach, no lake or river, no farm or forest, no hut or village did I see without its temples.

In the prettiest spot on every little farm patch stands the family altar, usually shaded by trees or plants. Here the farmer builds the wood or stone altars to the gods of his choice. Should a man's prayers go unanswered, he is quite justified in demolishing his existing altars and building new ones to a new divinity.

### THE PRIESTS WORSHIP WITH THEIR HANDS

The strangest sight on my whole round-the-world trip was the aspect of the long-nailed, supple-fingered Bali priest (see Color Plate V). Sitting in the temple amid fragrant cut flowers, every part of his body rigid and motionless except his hands, the priest moves these in odd but graceful manner, making in the air various perfect geometrical figures, while chanting prayers. Amazing in their accuracy, these geometric figures were, and swiftly made by putting the extended thumbs, bent wrists, and spread fingers into different positions. But nobody could tell me what the figures meant.

Incense, holy water, a string of beads like a rosary, a little bell and the strange hand movements are all a part of the rites of the Bali priest.

One hears that once the cultured castes of this Hinduized island spent hours every day reading the history, theology, and poetry of Indian literature.

Much dancing there was and masque and puppet plays, but I didn't see anybody reading.

John and I sat through one performance at a temple, where the drum and gong orchestra went on for hours. "What are the actresses saying?" I asked. But the interpreter couldn't tell me, for the talk was not in everyday Bali words, but in the old sacred, or Kawi, tongue, interspersed with Sanskrit words.

### THE TEMPORAL POWER OF BALI'S PRIESTS HAS ENDED

The priests keep the books of big tree leaves and "fish-worm" writing; they know the old languages, the significance of mysterious geometric figures in the air (see Color Plate V). And rajahs wear the jewel-hilted kris. But the wings of both are clipped, for although religion, as the only Bali American said, is the island's chief occupation, the temporal power of priests is gone; and so is despotic rajah rule. Now the superpower is the Dutch governor, living at Singaradja. Once the peasants had to throw themselves flat on their faces in the dust or mud whenever they met a rajah or a man of higher caste. Not now.

Although in theory Dutch rule doesn't tamper with old caste laws, with the passing of the rajahs and the obeisance they exacted, the social organization tends to change. Under old island laws, for example, if a high-caste girl married beneath her station, the people used to catch her and burn her and put her plebeian husband in a sack and throw him into the sea. To-day, of course, the Dutch forbid this. So love now defies caste.

During my month's visit I made my headquarters at Den Pasar, near the southern point of Bali. There I took a small house, built by one of the hundred Dutchmen on the island. From Den Pasar roads lead off northwest and to the eastern shore of the island. The desert-like western half has no roads and is practically uninhabited.

Although it is only from 15 to 50 miles from north to south and 93 miles from east to west, in early times the island was divided into small kingdoms, and these were almost constantly at war. But now only one native ruler, the Rajah of Karang Asem, remains in power. He is semi-independent and nominally holds sway over about 160,000 subjects.

Under the Dutch a few members of old native royal families hold positions of local authority. They administer native laws with the aid of a few constabulary.

The only disorder I saw on the island, which set a whole village roaring with laughter, was when two market women fought over a fish!

About the time America battled for independence, Dutch slave traders were busy on Bali. In 1778 13,000 Balinese were sent to Batavia and forced to join the Dutch army. When the English began to take an interest in the island, the Dutch built forts on the Java side of Bali Strait and bid for the rajahs' support. In 1839 fear of English aggression led the Dutch to obtain from the Bali princes a recognition of Dutch supremacy, but without right of interference in the island's internal affairs.

### PLUNDERING OF WRECKED SHIPS COST BALI ITS INDEPENDENCE

It was the "Tawan Karang," or "shore right," which finally led to fighting between the Dutch from Java and the princes of Bali. This Tawan Karang was a right claimed by the Balinese—the right to plunder any foreign ship which went ashore on Bali or was in distress in its waters. As late as 1904 this right was exercised and the Dutch defied.

Off and on for nearly 100 years, the Dutch quarreled with the Balinese and many a rajah was slain. More than once a rajah and his whole family committed suicide rather than be deported or submit to Dutch rule.

To-day Bali is peaceful. The Tawan Karang and slavery are abolished and the opium trade is fairly well controlled.

### BALI'S IRRIGATION SYSTEM REFLECTS GREAT ENGINEERING SKILL

No region on earth is more highly cultivated than the tillable parts of Bali. Here irrigation is applied to its utmost refinement. In building reservoirs, or *waduks,* in laying out and digging canals and laterals, the Balinese are among the world's most skillful engineers. So highly was their system developed that when Dutch engineers came they had nothing to add.

On Bali, as in the United States, irrigation districts are set up. Each controls its own water supply, and water rights are equitably distributed. It also regulates land transfers and holdings. The planting of crops, the tending of cattle, and collection of rates are all supervised by these coöperative associations.

Rice is the chief food, but wheat, copra, groundnuts, tobacco, fruit, and onions are also grown. Cattle, hides and horns, and swine are exported. For its soap, crude hardware, tools, and a limited amount of cloth and clothing, Bali depends on imports handled by Chinese and Dutch traders; but, to a singular degree, the island is a self-contained garden of Eden, where life is easy and food plentiful.

Swift and sweeping as change is in our modern, inventive world, Bali responds but slowly. Here the well-dressed young man and everybody else need wear only the sarong—a multi-colored strip of batik, about a yard wide, wound around the waist and hanging to the knees (see Color Plate XII). Till cheap factory-made sarongs came from Europe, these simple garments were works of art, for at weaving, as at carving and in the fabrication of objects of gold and silver, the Balinese are skillful. Only on entering the temples must women cover the upper part of their bodies. For this they use a light scarf.

When one stops to think that Bali, with its singular charms, is only a night's run from the tourist path through Soerabaya,

one wonders that irresistible civilization has not already upset its primitive life.

Of course, modernism is bound soon to sweep this primitive isle. I saw one upper-caste native girl, in complete European dress, drive a motor car up to a temple, get out with her offering of fruit and flowers, and follow the line of barefooted village women into the pagan house of worship with its frangipani trees and grotesque carven figures.

Already, as at Buleleng, on the north shore, the commonplace galvanized-iron roof of the white man's tropic conquest is lifting up its ugliness, and bicycles make tracks on sandy beaches. A few automobiles have come; hotels may soon be built, for tourists are beginning to ask, "Where is this trick island of Bali?"

The Dutch are founding schools, and already Bali has heard that the printing press is easier and faster than the old native method of writing with "fish-worm" letters on the broad paperlike leaves of a tree.

Some Bali boys have gone to Java to schools and two American composers are going to Bali to write its music, which is like ours, except the "la" of our do-re-mi is missing; and a well-known tourist agency considers routing its around-the-world cruises via Bali.

### FAREWELL TO THE ENCHANTED ISLE

It was the last day of my visit. Late in the afternoon I came to Sangsit, on a fine road that leads along Bali's north shore. Here yet another temple! Singular structures they are, ornately carved and more like open courtyards than roofed houses. At each side of the main entrance stand pyramidlike posts covered with odd carvings. Walls make the temple inclosure, over which there is no roof but the sky. Inside this compound, however, are little platforms and they are roofed over. Here the people put their offerings.

Horribly hewn faces and fierce grotesques cover the walls and balustrades. Often they are strangely like the old Maori carvings. One hideous mask always has his tongue stuck out. Other handmade gods have two big tusks, one in the upper and one in the lower jaw, which extend over the lips. In all lands where tigers eat people, I was told, this long-fanged god is a symbol of superpower.

On the beach at Buleleng I told John good-bye. Again the file of dogs, each intent on his own affairs. Turbaned, absent-minded men and women walking, walking, burdens on head, and all ignoring me—all minding their own business.

A heavy surf ran. To reach the ship's boat, one had to wade out. I wrapped my precious autochrome plates in my raincoat and held them on my head to keep them dry and waded waist-deep against incoming breakers.

As we rowed out to the ship, I looked back for the last time at Bali—at the file of erect, statuesque women walking. A lull in the noise of the surf, and on the breeze came again the echoing drumbeats of the gamelan, the squealing pig-song, and the hypocritical crow and cackle of pretentious poultry. And through the tropic dusk a lone ibis winged his way. . . . I want to go back.

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## "THE DISCOVERER," WITH THIS NUMBER OF THE NATIONAL GEOGRAPHIC MAGAZINE

MR. N. C. WYETH has recently completed for the headquarters of the National Geographic Society in Washington a series of five mural paintings depicting the Romance of Discovery. The first of the group, "The Discoverer," is reproduced as a special supplement with this number of the NATIONAL GEOGRAPHIC MAGAZINE. A limited edition of the supplement has been printed on special art paper and will be mailed, unfolded, at $1.00 each, to members who desire to frame it.

Photograph from Brig. Gen. P. R. C. Groves

LOOKING DOWN 4,000 FEET UPON THE WHITE CITY OF DAMASCUS, PEARL OF THE ORIENT

Backed by bare, chocolate-colored, lime-streaked mountains, this oriental jewel lifts pink roofs above the emerald sea of surrounding orchards. One of the oldest, if not the oldest, of the world's inhabited cities, Damascus is thoroughly Mohammedan. Its luscious fruits make it "the paradise on earth" for which the Prophet sighed, and have caused it to be extravagantly extolled by the poets of the sterile Arabian peninsula.

# SEEING THE WORLD FROM THE AIR

By Sir Alan J. Cobham

IN THE course of my work during the past five or six years I have seen many parts of the world.

My wanderings have taken me over every capital in Europe and over the length and breadth of the great African continent.

More than once I have traveled over the great Syrian Desert to India, Burma and back, and only recently I journeyed all the way to Australia and return via Rangoon, Singapore, and the Dutch East Indies.

Yet with all these wanderings it was not until a few months ago that I made my first steamship voyage, when I crossed from Southampton to New York.

Hitherto my journeys had been made in the air, and my mode of transport was an airplane or seaplane, and when I reflect on my various exploits, somehow I feel that my memories and impressions of the countries I have visited are far more vivid and realistic than are the memories of the individual who has traveled by steamship, train, or motor car.

### STUDYING ARCHEOLOGY BY AIR

Early in 1923 I made a circular tour, covering about 12,000 miles, over Europe, Egypt, Palestine, Algeria, Morocco, and Spain. My passenger was an old friend, whose greatest hobbies were travel and the study of ancient civilizations.

We had flown many thousands of miles together on previous occasions, but this trip was a little more ambitious. From London we flew to Paris, through France, along the Riviera coast line, across Italy to Greece, and then over the Mediterranean to Africa and Egypt.

Then, for the first time in history, we flew across the whole breadth of Africa, from Egypt to Morocco, after which we crossed the Strait of Gibraltar and by way of Spain and France returned to London.

My passenger was an enthusiast about traveling by air, for to him there was no more delightful way of seeing the countries whose history he had studied. Thus, on our flight from Brindisi, at the heel of Italy, over the Adriatic to the island of Corfu, and down the mountainous coast of Greece, through the Gulf of Patras and the Gulf of Corinth to Athens, he was able to see spread beneath him the scenes of Greek mythology and of Greek and Roman history that he had read about since his youth.

### THE HOP FROM EUROPE TO AFRICA

Our first view of Athens and the famous Acropolis was from the air (see page 357). After a few days in the town, during which we visited the Parthenon and the Stadium, the latter built on the site of the ancient Stadium where the Greeks of old held their Olympic games, we began to prepare for our flight across the Mediterranean.

One fine day we left Athens and flew out over the Ægean Sea; then over the island of Crete, where the first aviators were born. According to legend, their names were Dædalus and Icarus. Having made themselves wings of feathers, they fastened them on with wax and began their flight. Dædalus reached Sicily, but Icarus, exulting, flew too high, and as he neared the sun the heat melted his wings and he fell into the sea.

However, no such ill fortune befell us. We soon left snow-capped Mount Ida behind and then on a compass course headed for Sollum. We were nearly three hours out of sight of land, but at last the coast of Africa came into view and we discovered that we had hit our objective within one mile.

Sollum is an Egyptian frontier outpost on the edge of the desert. On the night of our arrival we were entertained by the resident officer, and the Governor of the Northwestern Egyptian territory was also a guest. The latter spoke of the difficulty of traveling about his desert domain, and said that in the morning he would have to start on a weary two-days' journey by car to Siwa.

On consulting a map, I discovered that Siwa was an oasis some 200 miles to the south, in the Libyan Desert.* I suggested

* See, also, "Crossing the Untraversed Libyan Desert," by A. M. Hassanein Bey, in the National Geographic Magazine for September, 1924.

AIR ROUTES FLOWN BY THE AUTHOR OVER EUROPE, ASIA, AUSTRALIA, AND AFRICA

Sir Alan Cobham's wanderings by airplane have taken him over every capital in Europe and over the length and breadth of the African continent, as well as on one round-trip voyage from London to Australia (see page 349).

that he might fly there in a little over two hours. Readily he accepted the invitation.

We landed near Siwa on a gigantic salt-pan, the bottom of a dried-up salt lake, which was as smooth and level as a billiard table and made a perfect landing field (see page 359).

As soon as the machine had come to rest we discovered an Arab convoy with camels, which had been instructed by telephone to meet us. It was dark before we reached the village, so we had to wait until the morning to see the wonders of the Senussi stronghold. Before the World War, a European visited Siwa at the risk of getting his throat cut, but since the conquest of these people, in 1917, all is quite safe. In fact, we found a solitary British officer, with a guard of native troops, in complete control of affairs.

## SIWA STANDS ON A ROCK IN THE SANDS

Until recently the whole oasis was afflicted with malaria, but in ten years un-

Photograph by Ad Astra-Aëro

FLYING OVER SNOW-CLAD SWISS PEAKS IS LIKE SAILING A SEA OF FROZEN BILLOWS

der British supervision this malady has been entirely stamped out. This was accomplished by requiring that every drop of stagnant water should be brushed or agitated twice a day, thus preventing the mosquito from breeding.

The desert in this part of the world is not sand, but hard, dry earth, in many places as level as a billiard table.

So, on the following day, after enjoying mint tea in an oriental garden with the local sheik, and before taking off from our natural airdrome for Matruh, I took a few palm leaves and swept on the surface of our landing ground—that is, I scratched on this dried earth—a huge circle, and then a big T, to mark the site for the benefit of future aviators arriving in Siwa. The governor told me that these marks would remain for at least 20 years, as it never rains at Siwa.

FROM THE AIR THE NILE VALLEY APPEARS A WIDE RIVER OF GREEN

At Matruh there was a beautiful lagoon, and here, according to some accounts, Antony and Cleopatra once had a villa.

After flying eastward for 300 miles along a barren coast, we came to a spot where the desert abruptly ceased, and in a few yards the land was a mass of rich cultivation: we had come to the boundaries of the great Nile Delta.

In time we descried two peaks on the horizon, and after a few minutes we could distinguish the angular shapes of the Pyramids of Giza. Farther on we could see more pyramids, and then we realized that we were in the land of the Pharaohs.

In flying over Egypt one soon comes to realize that the country is nothing more nor less than Nileland, and that without this great river the nation would not exist. When seen from an airplane at a great altitude, Egypt appears to be a gigantic river of green vegetation, winding its way through a vast desert land, and in the middle of this ribbon of vegetation are the glimmering waters of the Nile, flowing northward, the source of every atom of life in this ancient land.*

From Cairo we followed the Nile to Luxor, and before landing surveyed from

* See, also, "The Land of Egypt," by Alfred Pearce Dennis, in the NATIONAL GEOGRAPHIC MAGAZINE for March, 1926.

Photograph from Ernest Peterffy

"GETTING IT HOME BY SATURDAY NIGHT": A CORFU WASHERWOMAN

the air the Valley of the Kings, Thebes, and Karnak. Afterward we landed on a clearing on the edge of the near-by desert, and spent several days studying on the ground what we had seen from the air.

### OVER THE VALLEY OF THE KINGS AND THE ASWAN DAM

Now the journey from Cairo to Luxor takes a whole day by train, but we had accomplished the trip with comparative ease in four hours.

Proceeding up the Nile, we passed over many ancient temples, including Esna and Edfu (see page 362), until we came to Elephantine Island, with the First Cataract and the great Aswan Dam beyond (see page 361). In the reservoir behind the dam we could see the submerged temples of Philæ, which, until the construction of the great dam, stood high and dry.

It was getting late in the year and the hot season was coming on, so we did not wish to run the risk of overheating our engine. We decided to start for Halfa very early in the morning, and soon after dawn we were in the air, flying over the great reservoir and following the Nile southward.

The river here flows through a deep, rock-walled valley. When the dam was constructed at this valley head, the waters were unable to escape over the desert, but were confined within the rocky walls, thus creating a reservoir nearly 200 miles long.

All the way along the upper reaches of the Nile we kept flying over ancient Egyptian temples, until at last we came to the world-famous Abu Simbel, a temple hewn out of the solid rock, with huge monolithic figures mounting guard at the entrance (see page 363). At the extreme end of this great cavern hall is an altar. There are no windows in the temple and the only sunlight enters by the doorway, which faces due east.

We flew on until we came to the Second Cataract, at Halfa; and then, after circling two or three times, we flew back to Aswan, having been in the air about five hours. We arrived at our hotel in time for a late breakfast—a striking contrast to the week required to make the trip by paddle steamer.

On our return trip to Cairo we were

Photograph from Ernest Peterffy

A MILKMAN OF CORFU

This method of delivering the beverage saves the cost of running a wagon, and, with the customer looking on, affords no chance to water the milk.

flying in the region of Abydos, when suddenly the motor began to falter, and I realized that I should have to come down immediately. For two or three miles on each side stretched irrigated fields crossed by deep ditches. It is almost impossible to land safely in such territory; so, with my engine missing badly, I pushed the nose of the machine down a little in order to keep up our flying speed, and headed for the edge of the desert.

We landed safely, but had not been on the ground two minutes when we were surrounded by scores of natives, who threatened to damage the machine in their efforts to get near it. Happily the village headman soon came on the scene, and when I appealed to him to keep his fellows off the wings, he straightway issued an order to his police assistants, who instantly attacked the crowd with their sticks in a most alarming fashion. I was rather disturbed lest the populace should imagine that it was my wish that they receive such severe chastisement, but later I noticed that they all seemed to take it as a joke (see page 364).

When the crowd was back at a safe distance and ropes had been erected around the machine, we set to work and repaired our broken valve spring, and, after spending the night with the governor of a town near by, we proceeded on our way the following morning, reaching Cairo in time for lunch.

### A SHIP IN THE SANDS

While at Cairo we decided to make the trip up into Palestine. Taking off from Heliopolis airdrome, we headed along the eastern edge of the Nile Delta for the Mediterranean coast.* After a half hour's flight I was amazed, upon looking over the desert toward the east, to see a big steamship gliding slowly through the sand!

As I came nearer to the boat I could see the straight gleam of the waters of the Suez Canal, which, owing to my oblique angle of vision, had at first been obscured. My steamship was not passing over the sand, but floating on the waters of the canal (see page 365).

* See, also, "Flying Over Egypt, Sinai, and Palestine," by Brig. Gen. P. R. C. Groves, and Maj. J. R. McCrindle, in the NATIONAL GEOGRAPHIC MAGAZINE for September, 1926.

Photograph by Ewing Galloway

A MORNING CROWD IN THE MARKET PLACE OF CORFU

Famous since Homer's day for its fruits and its beauty, land on the Greek island of Corfu is leased to tenant farmers in perpetuity. Here olive trees 300 years old are still in bearing.

This was my first visit to Palestine, and, recalling certain parts of the Scriptures, I remembered how the Tribes of Israel had wandered from the desert up into a "land of milk and honey"; and it was interesting to see from the air how the country gradually changed from barren, sandy desert (see page 366) to scattered scrub, and from scattered scrub to sparse cultivation, until at last we reached the farmlands of Palestine. Even so, there were many barren tracts and stony places which could hardly be described as a "land flowing with milk and honey."

We flew over Jerusalem on Good Friday, with a Bible as a guidebook, and, after circling the city many times, we went down to Bethlehem, and from there over the valley of the Dead Sea, its bottom being 1,300 feet below sea level.

We wandered up the Jordan Valley to the Sea of Galilee, and then crossed over the hills to Nazareth, and so came back to our landing ground at Ramleh, below Jerusalem. Later we visited all these places on foot, but with a far better grasp of their physical relationship through having seen them first from the air.

### SKIRTING THE SHORES OF NORTH AFRICA

On our homeward journey we flew back over our tracks as far as Sollum, and then over Tripolitania for several hundred miles to Benghazi.

In the time of the Romans the whole of this North Africa coast was a great wheat-growing region; to-day it is practically desert country, in which here and there Arabs raise a few sheep and goats. Year by year the Sahara has encroached and the winds have blown the sand over the arable lands until they have been virtually obliterated.

The flight from Benghazi to Misurata, on the opposite side of the Gulf of Sidra, was one which presented many hazards. It was a distance of nearly 500 miles; there was no possible opportunity to refuel, and the country was in the hands of the wild Senussi, with whom the Italians were at war.

Our Italian friends told us that they could not be held responsible for our safety if we were forced to land on this strip. If the Arabs caught us, they would certainly torture and mutilate our bodies, as they had done their soldiers in the past.

However, the trip had to be made, even though I had doubts as to whether I had sufficient gas capacity if heavy head winds were encountered.

With every tank full to the top and with as many tins of gasoline as we could pile on board, the machine was overloaded, but we had a good airdrome from which to take off, and so we managed to climb slowly into the air. The front cockpit was so filled up with tins of gas that Woodhams, my mechanic, had to kneel on the seat with his head down until such time as we could empty some of the gas into the main tanks.

### REFUELING IN THE AIR

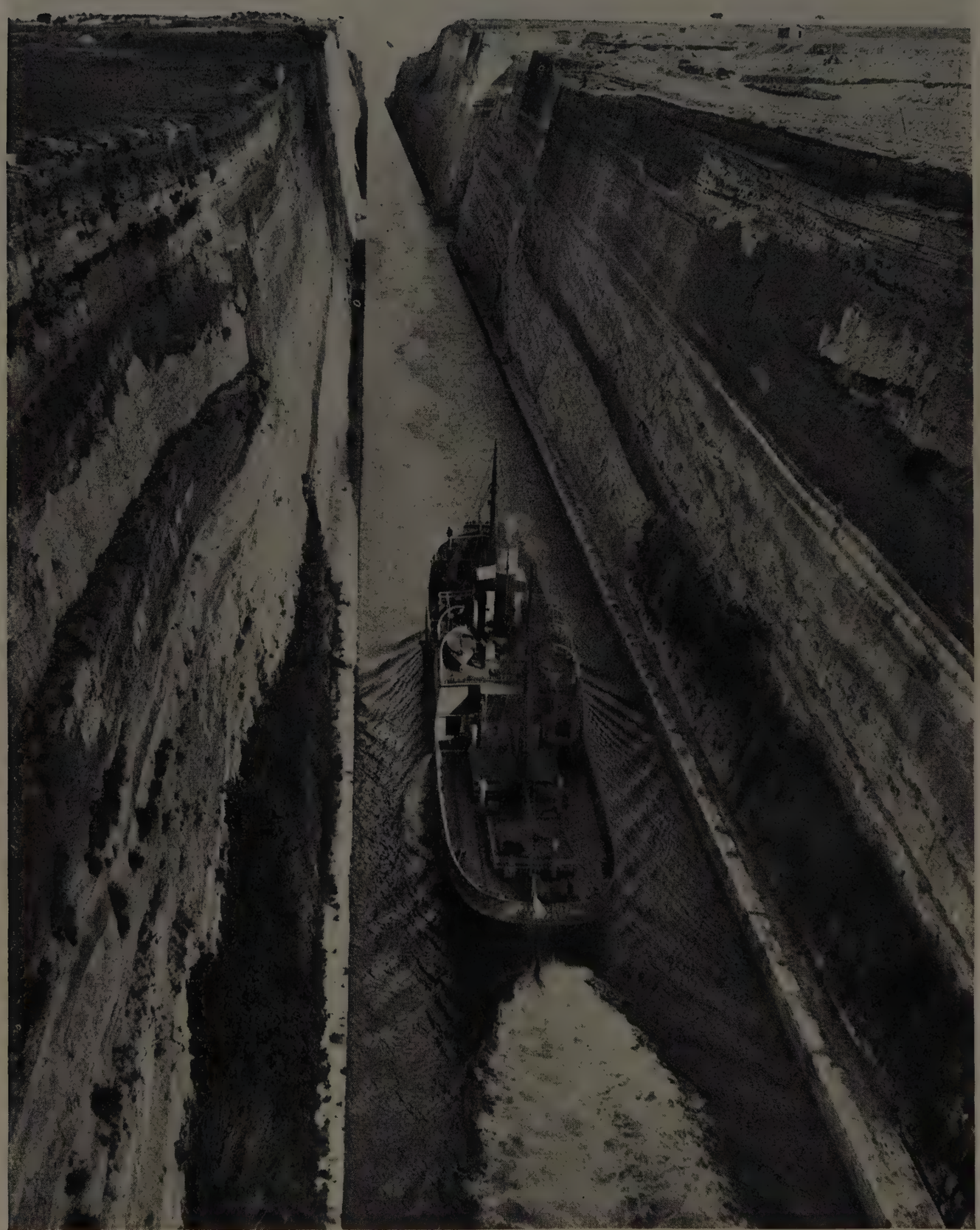
Before starting we soldered a small copper pipe in the top of each tin of gas and over this put a piece of rubber tubing which passed into a hole in our main tank, for we were going to refuel in the air.

After we had consumed four gallons of gas from our main tank, Woodhams set about his arduous task of emptying one of the tins down the rubber tube. He did this by holding the tin more or less above his head, notwithstanding the terrific force of the wind against it, while the gas ran down the rubber pipe. After the tin was emptied, he would stand up in his seat and throw it overboard with force, else the slipstream of the propeller and our forward speed would cause the can to collide with the tail of the machine.

Added to all these precautions against being forced to land in the enemy territory, we carried a letter, written in Arabic, which explained that we were not Italian soldiers, but harmless British civilians touring for pleasure, with no arms on board.

As it happened, we had a delightful, more or less uneventful flight to Misurata, and then proceeded to Tripoli, and so on to Sfax, in Tunisia.

There is not space to tell here of all our little adventures in Tunisia, Algeria, and Morocco, but about a week later we crossed the Strait of Gibraltar to Spain, intending to fly on to Granada. Owing to the very heavy rain and low clouds over the mountains, I decided that it would not be safe to continue in that direction, so proceeded toward Seville. As my pas-



Photograph by Ewing Galloway

NAVIGATING THE SWIFT WATERS OF THE CORINTH CANAL

More and more, in our complex commercial life, impatient man seeks short cuts for his cargoes. This Corinth Canal shortens the route from the Adriatic to Piræus, port of Athens, by about 200 miles. It was started 47 years ago by a French group and finished in 1893 by the Greeks. It is said that Nero, the fiddling emperor, started to dig a ditch along this same route, over which the ancients once dragged their ships.

Photograph by Sir Alan J. Cobham

LOOKING DOWN UPON THE ACROPOLIS AT ATHENS

In the center, the Parthenon, most perfect monument of antiquity, crowns the Acropolis. The area at the foot of the north side of the Acropolis is now the city's most dilapidated section, but was formerly the ancient center of Athenian life. In the background rises Mount Lycabettus, and to the right is the Royal Palace.

senger remarked, one of the delights of aërial touring is that you are never quite certain where you are going to turn up.

However, such experiences were rare, as we usually made our objective. We visited Granada two days later and wandered around the ancient Alhambra (see page 368).

### PLANNING A FLIGHT TO INDIA

The final stage of our journey, from Madrid to London, was made in one day. We breakfasted in Madrid, had lunch in Bordeaux, sipped afternoon tea on the airdrome of Lympne, near Folkestone, and dined in London, thus completing with a wartime machine a tour of more than 12,000 miles without any preliminary organization or set route.

In the autumn of 1924, Air Vice-Marshal Sir Sefton Brancker had to make a journey to India in connection with the allotting of a port of call and the building of a mooring mast for the future airship service that may eventually run through to Australia.

As Director of British Civil Aviation, Sir Sefton Brancker maintained that he ought to fly to his destination; but the Treasury argued that Government officials should travel by the cheapest route, and as the cost of a special airplane to fly to India and back was far in excess of the cost of a first-class steamship passage and return, the Treasury could not see its way clear to grant the sum of money necessary. However, on learning that the aviation industry was willing to support

Photograph by Sir Alan J. Cobham

THE HEADQUARTERS OF THE BRITISH RESIDENT IN THE OASIS OF SIWA
(SEE TEXT, PAGE 350)

the flight, the Treasury became more lenient and a good portion of the expense of the journey was allotted.

The Director decided that, as we were going to fly to India, and possibly beyond to Rangoon, in Burma, he would make it a flight of survey and would endeavor to ascertain the best air route.

We had a depressing and tedious journey through Europe in the wintertime, for we left London in November, and it was not until the Persian Gulf was reached that we met the sunshine. I was greatly impressed by the many weird and wonderful rock formations along the hundreds of miles of forbidding coast line from Iraq down the Persian Gulf, then over the Gulf of Oman to India.

So regular are these formations that they seem artificial. At one spot for 40 or 50 miles the rocks sloping down to the sea were like an inverted tile roof, flat slabs of three-cornered rock overlapping each other with remarkable precision, each slab about 100 yards to the side.

At other places the whole coast for many miles inland was a mass of miniature pinnacles of rock, each little peak about 100 feet high, with almost perpendicular sides (see page 370).

As we flew over them at a great altitude, they suggested a bed of spikes, or a kind of legendary hell, such as an aviator might dream of in a nightmare and imagine that he had to make a forced landing on them. As I looked down, the ground did not seem to belong to this earth. I seemed to be flying over a dead planet (see page 371).

### SKIMMING OVER RAINBOW ROCK FORMATIONS

Near Bandarabbas we came across some remarkable colored rock formations. There were mountains of deep purple, and right alongside would be a hill of beautiful jade green, and just beyond mountain heaps of deep yellow. In between these upheavals were old, dried-up water beds of silver sand, contrasting with the vivid earth colors all around. There were hillocks of scarlet hue and others of deep indigo.

Afterward I discovered that these were the wonderful oxide formations that have been sought after and mined through va-

Photograph by Sir Alan J. Cobham

THE AUTHOR'S PLANE ALIGHTS ON A SALTPAN NEAR SIWA

Having covered 200 miles of desert in two hours—a journey which would have required two days by automobile—Sir Alan and his guest were met on the outskirts of the oasis of Siwa by an arab camel convoy which had been notified of the visit by telephone (see text, page 350).

rious stages in history. We are told that the Phœnicians came to the Persian Gulf for oxide, and the Portuguese worked a mine on the Island of Ormuz more than 400 years ago. The weather was dull when we passed by, and the rock colorings contrasted vividly, but to my surprise I discovered later that when the sun shone on the same formations the vividness of the coloring disappeared.

It was winter in India and the weather was perfect. As Sir Sefton Brancker wished to visit one or two places where it would be impossible to land an airplane, he went on by train from Karachi, which was our first port of call in India. Here a big mooring mast is being erected for the future airship service, and this port is also the terminus of the air line that is now in operation between Egypt and India.

Our flight from Karachi to Delhi was via the Thar, or Indian, Desert and Jodhpur. On the first day we successfully crossed the desert, a journey of several hundred miles, and, having located a big river, I began to look ahead for the town of Jodhpur (see page 371).

We were to be the guests of the Maharaja, who has a palace crowning a rock that towers hundreds of feet above the level plain on which the capital of the native state is built. I soon located it on the horizon, and then remembered that the Maharaja had a private airdrome. As I neared the town, I could see on the far side an enormous cleared space surrounded by beautiful trees, which I instantly surmised was the airdrome, although I did not approve of the surrounding high trees.

### NARROWLY MISSING A POLO MATCH

I already knew the direction of the wind by the various smoke fires that I had seen in the fields, so made straight for the landing ground.

As we were passing low over the tree tops, I looked over the side of the machine and discovered that on the edge of this ground there was a magnificent pavilion thronged with fashionably dressed people. Near by a military band was playing. It was all very bewildering, for I could not imagine why there should be such a wonderful turnout for the mere arrival of an airplane.

By this time I was almost down on the ground and was just preparing to flatten

Photograph by Sir Alan J. Cobham

THE DRIED-MUD TOWN OF SIWA STANDS ON A HIGH ROCK IN THE LIBYAN DESERT

Around about the town, which resembles in some respects an Arizona Hopi village, lies the historic oasis of Jupiter Ammon, planted with palm trees, orchards, and grain.

out and land, when in the distant corner of the field I noticed a couple of mounted polo players cantering around the corner. I suddenly realized that I was about to descend in the middle of a polo match.

Without hesitating, I pushed my throttle wide open, and before my wheels could touch the ground my engine had opened out and the plane climbed away into the air over the far tree tops. I found the real airdrome near by and got down easily.

### A GLIMPSE OF THE TAJ MAHAL FROM THE AIR

On our journey across India we turned aside toward Agra, so that we might have a glimpse of that world-famous monument, the Taj Mahal. We circled around many times at an elevation of a few hundred feet, admiring the beauties of this marble tomb erected at the order of a Mogul emperor to the memory of his favorite wife. Arthur Buller Elliot, my engineer, did his best to take photographs, while I maneuvered the machine in order that he might get the views at the best possible angles (see page 372).

Our original plan had been to fly to Karachi only, but once in India we forgot about home contracts and orders, and as gas and oil were available, we just flew on until at last we crossed the whole peninsula and reached Calcutta (see page 372), where it had been arranged that we should land on the Maidan, the open park in the center of the town.

Photograph by Sir Alan J. Cobham

WHEN BRITISH ENGINEERS BUILT THE GREAT ASWAN DAM, IN THE NILE, A VAST LAKE WAS BACKED UP

The impounded river covered ruined temples and relics of antiquity; but waters worth millions of dollars to Egypt were made available for irrigation (see, also, text, page 352).

Photograph by Sir Alan J. Cobham

WHERE ANCIENT TEMPLES RISE ABOVE MUD TOWNS OF THE MODERNS

The great sandstone temple of Edfu, in Upper Egypt, is in almost as good condition to-day as when finished, 57 years before Christ. All through Egypt and the Near East, one is struck by the contrast between the splendid buildings of the ancients and the mean mud houses and ugly architecture of to-day.

The landing arrangements had been made by the local military, for there was no air force in this part of India, and their ideas of airplane landing requirements were a little hazy. A huge crowd was waiting to greet us. The portion of the park cleared for our use was absolutely unsuitable and the other part was thronged with natives and obstructions. I circled two or three times, wondering how I was going to get down.

Suddenly I sighted the deserted race course on the opposite side of the Maidan, and before the crowd had realized what was in my mind we had landed on this.

At Calcutta the Indian Government seemed anxious to have us survey the possibilities of an air route to Rangoon, nearly 1,000 miles farther on, and so we continued our journey along the tropical jungle coast line of Burma.

Somebody suggested that we might go on to Singapore, but I considered that we had come quite far enough; for I was beginning to think now of the homeward journey. London was more than 8,000 miles away, and 17,000 miles would be as much as we could expect from our engine without an overhaul.

At Rangoon great wonders greeted us, for we saw from the air the world-famous Shwe Dagon golden pagoda. There are many golden pagodas in the vicinity, but this is the greatest of them all, and we photographed it from every conceivable angle. I was told that, owing to the fact

Photograph from Sir Alan J. Cobham

THESE FIGURES, 65 FEET HIGH, ARE HEWN IN SOLID ROCK

This is the principal temple of Abu Simbel, dating from the days of Rameses II, or about 1250 B. C. The statues flank the entrance to the temple chambers, which are cut in the cliffs on the west bank of the Nile, above Halfa (see, also, text, page 352).

that the roof had been so repeatedly regilded, the gold leaf on certain parts of it was now over an eighth of an inch thick. As we arrived in the late afternoon, the glow of the sunshine on this temple was a sight I shall never forget (see page 375).

MONKEYS OF DATIA DEVELOPED A BREED OF EXPERT MARKSMEN

On our homeward journey through India we were the guests of the Maharaja of Datia, where we stayed a few days. The Prime Minister told us that, when he had arrived in Datia some years before, he had found the place infested with monkeys, which were rapidly destroying the roofs of all the buildings. These cunning creatures were addicted to the delightful pastime of tearing heavy tiles off the roofs of the houses and throwing them down on the passers-by in the streets, sometimes with fatal results. In the course of time they had developed a breed of monkey marksmen who seldom missed.

Now Datia is a Hindu state, and the followers of this religion have a tenet which forbids the taking of life of any sort; so the monkeys were left unmolested. The new Prime Minister decided that something must be done, and so he advised the Maharaja to offer 5 rupees as reward for every monkey captured and brought alive to the cages outside the palace.

A VILLAGE HEADMAN SAVED THE AUTHOR'S PLANE AFTER A FORCED LANDING NEAR ABYDOS, EGYPT

So eager were the curious natives to get near the flying machine that only drastic measures prevented it from being seriously damaged (see text, page 353).

Photographs by Sir Alan J. Cobham

AN AËRIAL VIEW OF UPPER EGYPT, WHERE THE BLESSINGS OF IRRIGATION ARE NOT FELT

The high, rough, empty regions along the upper Nile are much like some of the American Colorado River country. Here flying was precarious.

© Underwood & Underwood

SHIPS THAT PASS IN THE SUEZ

The news of this drastic action spread all over the countryside and was strongly condemned by the Maharaja of a neighboring state. The critic even went so far as to say that he was fond of monkeys, and that they were allowed to roam about his domain unmolested.

In the meantime at Datia hundreds of monkeys were being captured daily, and very soon there was not a simian left roaming free. The Prime Minister was now faced with the problem of disposing of them. He hit upon the bright idea of having them packed in baskets and loaded on board a special train which was dispatched to the neighboring state of the Maharaja who professed a liking for monkeys. When the train arrived in the chief town, several hundred miles from Datia, the animals were unloaded and let loose as a special gift to the potentate.

### A LONGITUDINAL SURVEY OF AFRICA BY AIR

It was a huge practical joke, and was talked of all over India. The poor Maharaja who had condemned Datia's action could say nothing, although inwardly he must have been furious.

After more than three months away from home I landed on the Croydon airdrome in the early spring, completing the first of a series of three big flights of survey of Empire Air Routes.

Our next big flight was from London to Cape Town and back. For this trip I selected the identical De Havilland type 50 plane that had taken us to Rangoon and back, but instead of the old-type engine, we installed a 385-horsepower, air-cooled Siddeley Jaguar. In order to negotiate easily the high-altitude airdromes in the Tropics, where the atmosphere is much rarefied, it was necessary to have the extra horsepower.

The first part of the trip through France, Italy, Greece, and over the Mediterranean to Cairo was not new to me, because I had covered this ground before on more than one occasion (see pages 349 to 357), and it was not until I had passed over Egypt and was well into the Sudan that I found myself over new territory.

Beyond Khartum we flew over the great Sennar Dam, recently completed across the Blue Nile, which prevents so much water running to waste in time of flood after the heavy rainfalls in Ethiopia. The

Photograph from Brig. Gen. P. R. C. Groves

THE SINAI DESERT SEEN FROM AN ELEVATION OF 4,500 FEET

The small caravan nearly in the center of the photograph is moving down to the cisterns and wells to the left, at a place about 70 miles east of Kantara. The men and camels are difficult to see, but their shadows are clear. When looking down vertically from an airplane, the shadows of objects are often the most important clue to their nature.

dam has created a gigantic reservoir, which stores water for an enormous irrigation system that makes available for cotton growing more than a million acres of hitherto waste land.

As we journeyed south we were greatly impressed by the changes in the native tribes. At Malakal our machine was entrusted to the Shilluks, who placed it in the center of their village (see page 378). After Malakal we flew for nearly 400 miles to Mongalla, over a swamp region known as the Sudd area, through which somehow the Nile wends its way. The swamp is inhabited by various primitive tribes, who lead a simple existence, knowing nothing about clothes and the habits of civilization.*

At Mongalla, owing to the great heat, we found that we could do very little manual work, and had to depend upon the natives to help us clean the machine (see page 378).

We had traveled nearly 3,000 miles up the River Nile from the Mediterranean coast, yet at Mongalla we were only about 1,000 feet above sea level. In the next two or three hundred miles, however, the ground rose suddenly, and at Jinja, on the shores of Lake Victoria, we found ourselves on the high plateau of central Africa, more than 4,000 feet above sea level.

Owing to the heat, the altitude and other local conditions, the density of the atmosphere was very different from that of northern Europe. At times the air in central Africa on some of the landing grounds was equivalent to the atmosphere at 10,000 feet in England, and it was here that we found the need for our extra horsepower in order to take off and climb away on the rarefied air.

Near Jinja we saw the Ripon Falls, the source of the White Nile, and the only outlet to the great Lake Victoria.

### FLYING THROUGH THE MISTS OF VICTORIA FALLS 50 FEET ABOVE THE BRINK

Of our journeys through Tanganyika and Northern Rhodesia there is no space to tell in this article. But we cannot pass by the Victoria Falls without describing how the Zambezi, which is a mile and a quarter wide at this point, flows gently on its way and when seen from an airplane seems suddenly to disappear into a crack in the earth.

This great African river falls for 360 to 400 feet into a narrow chasm. In the center of this cleft is the only outlet, a narrow gorge through which all the mighty waters have to escape.*

On this flight to Cape Town I had with me a professional cinematographer, Emmott, in addition to my engineer of the England-to-India trip (see text, page 360), and while Emmott took the motion pictures, Elliot used to try to take the still pictures. When we had flown beyond the falls the sight was so magnificent that we decided to come down low and take a close-up picture of the brink.

This maneuver was interfered with by the continual banks of spray, which kept rising and completely enveloped our machine in heavy clouds of mist as we skimmed along only 50 feet above the brink (see pages 376 and 377).

While we were flying at this low altitude over this perilous country, our engine faltered and started to splutter. Elliot and I both realized what had happened: the spray was so heavy that water had entered the carburetor.

It was an unpleasant moment, for beneath us was the deep chasm and the turmoil of waters, while on the one side we had the River Zambezi flowing toward the brink, and on the other a dense forest jungle; and for miles around no earthly chance of finding a cleared space on which to land.

I gave the engine full throttle, and while it banged and spluttered we climbed away and headed for our airdrome at Livingstone. Fortunately the carburetor cleared itself of the drops of water, and once more our motor began to purr smoothly.

All the way through Africa we surveyed the possibilities for air routes, and finally reached Cape Town with the first airplane to make the cross-continent flight. Then, after a brief overhaul of the motor, we turned about and flew home, making the return trip in 15 days.

* See, also, "Cairo to Cape Town Overland," by Felix Shay, in the NATIONAL GEOGRAPHIC MAGAZINE for February, 1925.

* See, also, "The World's Great Waterfalls," by Theodore W. Noyes, in the NATIONAL GEOGRAPHIC MAGAZINE for July, 1926.

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THESE FROWNING TOWERS OF ALHAMBRA HAVE SPECIAL INTEREST FOR AMERICANS

In the spacious throne room in the tower on the left, Queen Isabella gave Columbus her jewel box, bidding him sell the contents and start on the voyage which resulted in the discovery of America. Back in the Middle Ages, invading Moors held Granada, where they achieved this marvel of architecture, Alhambra. In the same year that Columbus came to America, Spain had triumphed over the Moors and claimed the matchless fortress palace as her own.

YOUNG MEN DRESSED FOR A PROCESSION IN SPAIN

As their faces must be covered while they are marching, these youths of Seville are taking advantage of this halt to lift their hoods for a breath of fresh air and for hurried puffs at their cigarettes.

Photograph by Royal Air Force

THE MOSQUE OF THE GOLDEN DOME AT SAMARRA, IRAQ

As one approaches over the Iraq Desert on a clear day, this golden dome can be seen for miles glistening in the sunlight. Long before the World War, it was often predicted in the Near East that if ever armies swept Mesopotamia these rich mosques would inevitably be looted. Yet when war came they were unmolested.

Photograph by Sir Alan J. Cobham

"A BED OF SPIKES, A KIND OF LEGENDARY HELL, SUCH AS AN AVIATOR MIGHT DREAM OF IN A NIGHTMARE"

From Iraq down the Persian side of the Persian Gulf, the airman flies over a mountainous region which bristles with sharp pinnacles, among which no airplane could come to earth and live. These formations in shadow become a veritable kaleidoscope, reflecting deep purples, rich yellows, and brilliant greens (see text, page 358).

It was barely three months later when we again set out on another long flight of survey. This time it was to be Australia and return, but instead of going with an airplane we decided to do the job with a seaplane.

### A FLIGHT TO AUSTRALIA WITH THE ENGINE THAT FLEW TO THE CAPE

This meant very little alteration in our outfit, however, for all we did was to take our identical De Havilland type 50, that had already done the Rangoon and Cape flights and fit it out with a pair of Shorts' duralumin all-metal floats. Using the same Siddeley Jaguar engine that had done the Cape flight, we took off from the River Medway at Rochester, 33 miles east of London, on our 28,000-mile cruise to Australia and back.

It was difficult to get good pictures on the Australian flight, because we had purposely chosen to fly through the bad weather period—that is, the hot weather in Iraq and India, combined with the monsoon in India, Burma, and the Malay Peninsula. We wanted to find out whether it would be possible to fly through the torrential rains of the Burma coast, thus making our survey report all the more sound.

### TRAGEDY MARS THE AUSTRALIAN FLIGHT

The Australian flight was marred by disaster. Arthur Elliot, my capable and ever loyal engineer, lost his life, dying in the hospital at Basra, in Iraq.

For some unknown reason, possibly the result of overwork in preparing for the flight, I had been suffering from depression, both mental and physical, ever since the start at Rochester. Elliot, on the other hand, had been most cheerful.

We took off from Baghdad in the early

"I SEEMED TO BE FLYING OVER A DEAD PLANET": THE FORBIDDING LAND ALONG THE PERSIAN GULF

"In between these upheavals were old, dried-up water beds of silver sand contrasting with the vivid earth colors all around."

Photographs by Sir Alan J. Cobham

THE PALACE OF KISHANGARH, EAST OF JODHPUR, INDIA

Long ago the princes of India, with their families and retinues, lived safe from enemy assault behind the walls and bastions, the towers and turrets, of such fortified palaces as this. Now, what with air bombing, they are completely vulnerable (see page 359).

GOVERNMENT HOUSE AT CALCUTTA

In 1686 Calcutta was founded as a trading post. Now, with its splendid palaces, parks, and esplanade, its colleges, shops, and factories, and its vast trade by sea and by land with the Ganges and Brahmaputra valleys, it has become one of the great cities of the world.

Photographs by Sir Alan J. Cobham

A MAGNIFICENT TRIBUTE TO A FAVORITE WIFE

This white marble dream, with its all-satisfying beauty and purity of conception, is the famous Taj Mahal Mausoleum at Agra. It has been painted and modeled more often, perhaps, than any other building anywhere. It was built in 1632 by the Emperor Shah Jahan in memory of Mumtaz Mahal (see, also, text, page 360).

Photograph by Sir Alan J. Cobham

HERE DWELLS THE MAHARAJA OF GWALIOR

Into the palaces of her princes India has poured untold lakhs of rupees. Gwalior stands on an affluent of the River Jumna, 76 miles south of Agra. Its citadel has been called the grandest native stronghold in India.

morning, with the intention of following the course of the Euphrates to Basra—near the head of the Persian Gulf. I had not felt fit to start at the early hour of 5 a. m. Elliot and several of the Air Force boys had been looking over the machine while I endeavored to pull myself together. By 8 o'clock, I was able to climb into the ship, but was feeling very weak.

We headed southward from the River Tigris, seeking the Euphrates.

It was fair weather when we started, but after we had gone about 150 miles we ran into a dust storm, which became worse and worse as we proceeded. Finally, in order to find my way, I was forced to come down to within a few feet of the river bank.

We flew for many miles in this fashion, skimming low over the river and taking our direction from the bank, which showed up a little more clearly than anything else through the dust-laden air.

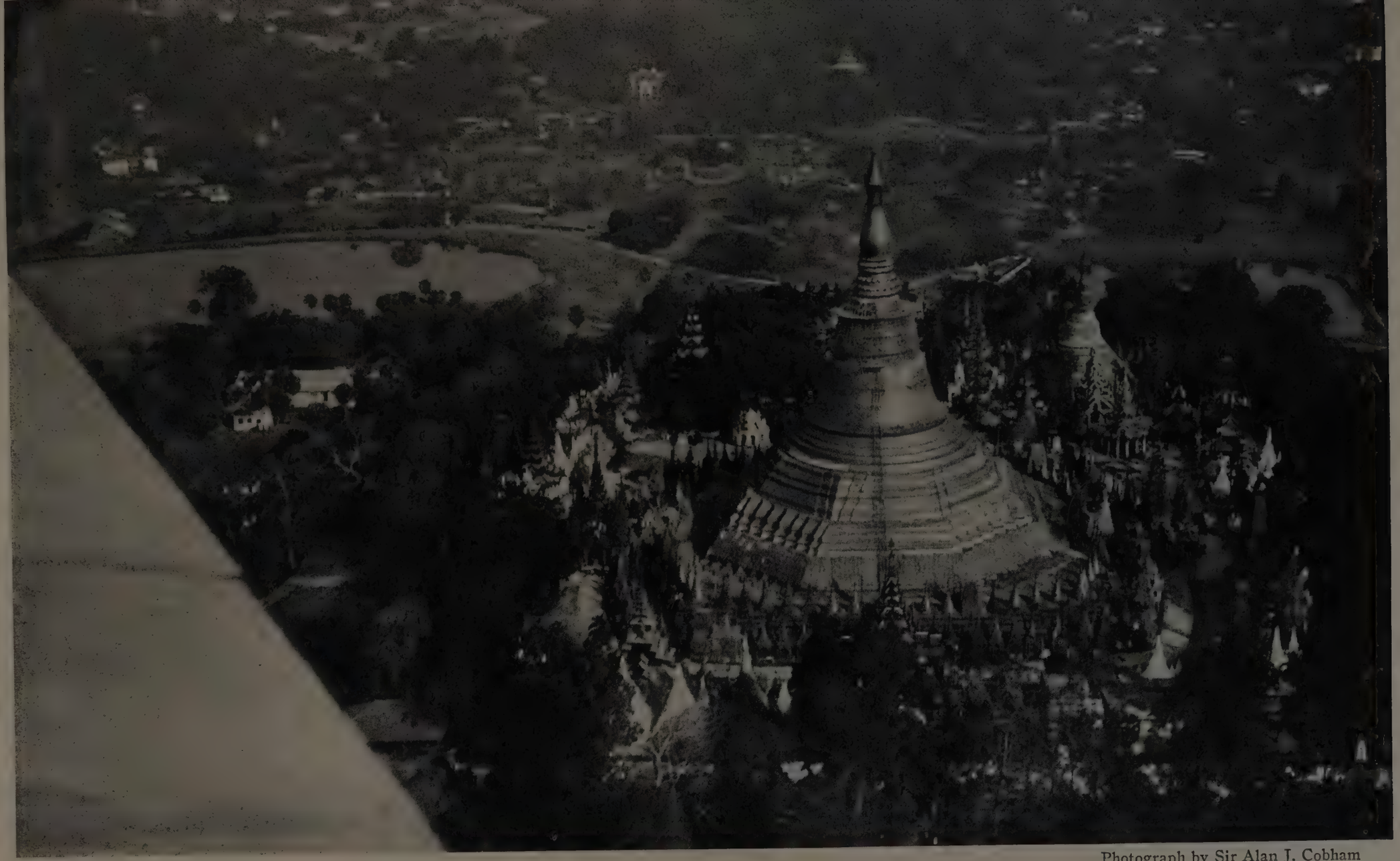
### DUST STORM FORCES A RIVER LANDING

At last, the air got so thick that I decided to land on the river and wait for a little while with the hope that the storm might clear. As soon as we alighted, I turned the machine toward the bank and beached it in the soft mud. I shall always

Photograph by Maynard Owen Williams

THE JAMA MASJID AT DELHI, ONE OF INDIA'S NOBLEST MOSQUES

An inscription in Arabic gives the date of the building as 1658, the year in which Aurangzeb deposed his father, the great Shah Jahan, builder of the Taj Mahal (see page 372). The three white marble domes are relieved by thin vertical lines of black marble, and the two minarets, rising to a height of 130 feet, are formed of alternate vertical stripes of sandstone and white marble, crowned by marble pavilions.



Photograph by Sir Alan J. Cobham

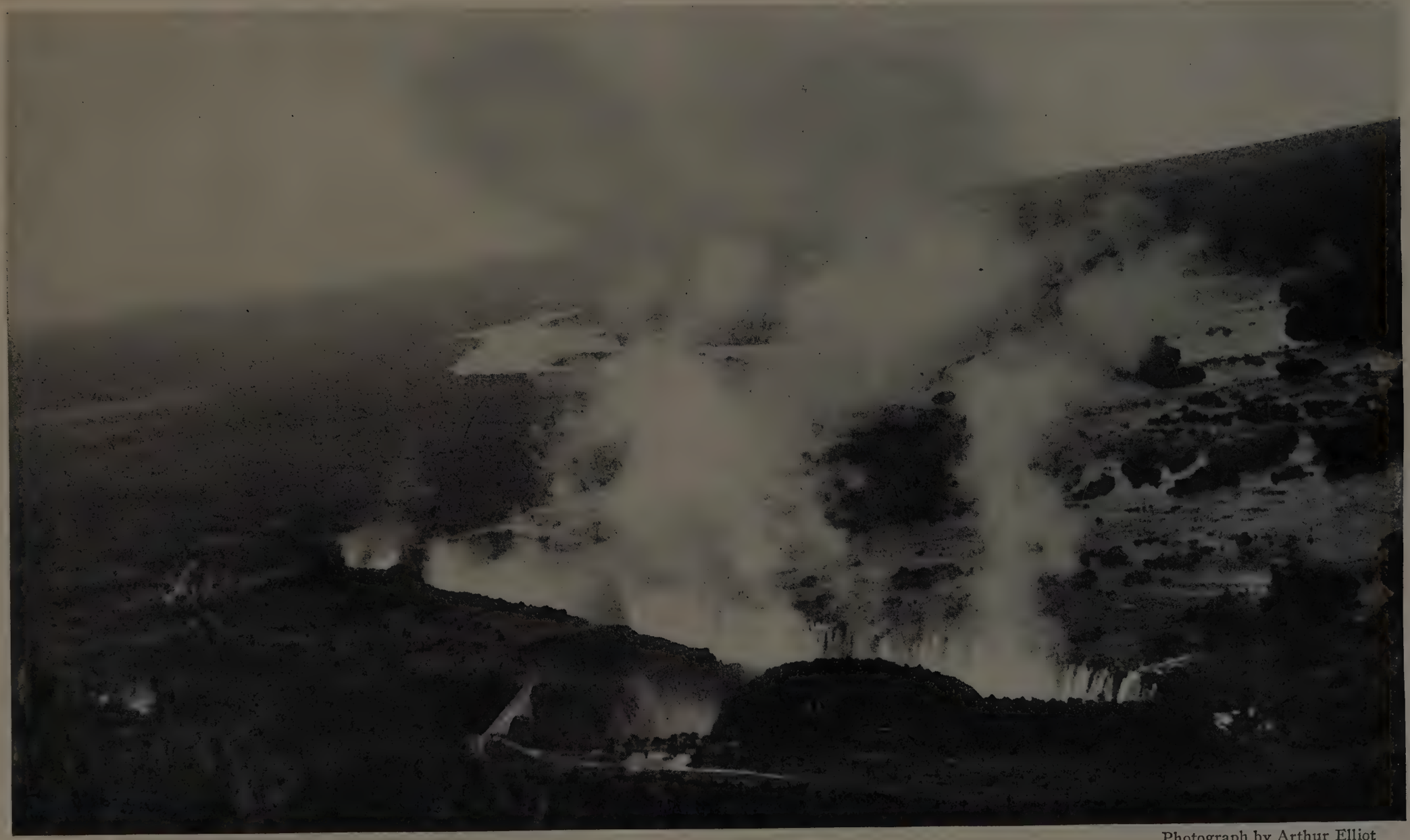
THE PAGODA OF SHWE DAGON, AT RANGOON

Seen only from the ground, the singular symmetry of Indian and Burmese temples is often obscured by surrounding structures, but from the air one may behold these triumphs of oriental architecture in all their bold beauty and dazzling details (see, also, text, page 362).

Photograph by Arthur Elliot

FLYING OVER THE FAMOUS FALLS OF THE ZAMBEZI RIVER, MORE THAN A MILE WIDE

The tumbling waters make a roar like continuous thunder. The 6,225-foot chasm has more than twice the depth of Niagara. These falls were rarely visited by white men before the railroad came, only 23 years ago (see, also, text, page 367).



Photograph by Arthur Elliot

"THE SMOKE THAT THUNDERS" IS THE NATIVE NAME FOR VICTORIA FALLS

The first white man ever to see this astounding work of Nature was the Scottish missionary and explorer, Dr. David Livingstone, who, coming down the Zambezi on November 17, 1855, discovered here one of the world's greatest waterfalls and named them after Queen Victoria. The gorge below the falls is spanned by the bridge of the Cape-to-Cairo Railway (see left foreground).

GUARDIANS OF THE PLANE: SHILLUK WARRIORS OF THE SUDAN

Smiling now, friendly with the white man and pleased to be photographed while brandishing their spears, but not so amiable in the days of Stanley, Livingstone, and Mungo Park. To these savages was entrusted the care of the author's plane during his stay in Malakal, on the upper Nile (see text, page 367).

Photographs by Sir Alan J. Cobham

THESE MONGALLA GIRLS WASHED THE PLANE FOR THE VISITING AIRMEN

Owing to the excessive heat encountered by the author in this part of the Anglo-Egyptian Sudan, he and his engineer were unable to perform any manual labor. These cheerful women proved to be willing, though inexperienced, "grease-monkeys," as the aviator terms those who tend his plane.

Photograph from Sir Alan J. Cobham

THE AUTHOR (RIGHT) AND HIS INTREPID ENGINEER, ARTHUR ELLIOT

On the flight to Melbourne, Elliot lost his life, not through airplane mishap, but at the hands of an Arab assassin (see text, pages 381-383).

remember Elliot's enthusiasm for the seaplane at that moment, because, as he remarked, it was so practical and safe; we could take refuge at any moment on the water beneath us.

There was a police hut near by and the native sergeant in charge, after putting a guard in our machine, took us inside where, sheltered from the dust, we rested on native beds that were quickly put up for us.

He then sent a horseman off, with the note that I gave him, to the nearest telegraph station, so that the authorities would know of our whereabouts and progress. After this we slept from 9:30 to noon, then enjoyed a refreshing meal of tea and melon. At about 2 o'clock the storm had cleared somewhat, so we decided to make another attempt.

### SKY AND WATER MELT INTO ONE

We took off safely and continued down the Euphrates, but after about 50 miles we ran into another bad dust storm. As we neared the head of the great Hammar Lake I could see that it was going to be most difficult for me to find my way, especially if I went out over the open water. The air above me, owing to the sand storm, was a dirty mud color, and the water beneath was the same. In fact, all around there was sand and one could not see more than 100 yards ahead.

### AN EXPLOSION IN THE CABIN

With this poor visibility, it was most difficult to fly, especially as we were traveling at about 100 miles an hour. I felt that if I went out over the open lake I might run the risk of flying into the water, owing to the similarity of color in every direction and the absence of any visible horizon. Under these conditions it was necessary for me to hug the swampy shore line of the lake, so that I might have a view of some sort of land that would give me my equilibrium.

And so we found ourselves zigzagging in and out along this swampy shore, feeling our way around the southern edge of the lake in an endeavor to get through that dust storm and hoping there would be clear air beyond.

Photograph by Royal Australian Air Force

AUSTRALIA'S NEW CAPITAL IS RISING IN THE RAW AND OPEN COUNTRY

Canberra has been boldly laid out, like a real-estate subdivision in some boom city of the American West. Its radiating tree-lined avenues remind one of the original plan of Washington, D. C. The site is in New South Wales, about 70 miles from the coast, some 150 miles from Sydney, and 300 miles from Melbourne.

We had been zigzagging over the swamp for some time and were nearing the more or less definite southern coast when, while flying at a height of about 20 feet from the water, we passed over a low strip of sand that jutted out into the lake. At that moment there was a violent explosion in the cabin!

Instantly I thought of fire and surmised that, owing to the great heat in which we were flying, one of the cartridges for our rocket pistol had exploded. This would be very serious, for it would most certainly have set us on fire.

I yelled through the connecting window from my cockpit to Elliot and asked him if we were on fire. He shouted back:

"No, but a gas pipe has burst and hit me on the arm."

I could see that he looked very pale and, as it was difficult to shout above the noise of the engine, which I could not shut off to glide, as I was flying only at 20 feet from the earth's surface, I handed him a pencil and paper. He handed me back a message written in a shaky hand to say the gas pipe had burst and hit him in the arm and that he was bleeding a pot of blood.

### "WHAT'S BEST FOR ELLIOT?"

I had to decide what to do. If I landed to render him first aid I ran great risks: first, of getting stuck in the mud, in which case we should be unable to get off again; second, of being unable to start the engine single-handed, owing to the terrific heat of the district.

I could see that if I landed in this wild and desolate spot, scores of miles from any sort of habitation, it would be a very serious matter if I were unable to start up and get away from it again. I could not look around me. I had to concentrate every second while I was flying, owing to the density of the dust storm.

I decided the best thing I could do would be to race on to Basra, which was about 100 miles farther on, where I knew there would be hospitals, white people, and proper organization. Soon after this we got through the storm and I was able to give the engine full throttle, so that we covered that 100 miles in about 45 minutes.

When I arrived at Basra I searched for a mud bank where I might beach the machine without damaging the floats, but I knew that it was going to be a one-man job.

I spotted a place, came down, and the moment I touched the water I made straight for this bank and ran my floats high and dry on to the shore.

### ELLIOT, MORTALLY HURT, THINKS FIRST OF THE ENGINE

I climbed out of the cockpit and lifted the lid of the cabin.

Elliot was in a terrible condition. He sat huddled in the corner, so pale that he was almost green. He could hardly speak. He just murmured to me that he was sure that he had a hole in his side from which he was breathing.

I managed to lift him in my arms out of the cabin, then on to the wings and so down to the floats.

There is one little episode which I shall never forget; it goes to prove how devoted Elliot was to his job.

It so happened that, with our air-cooled engine, the bottom cylinders were upside down. In order to prevent the oil from draining into them when the engine wasn't running it was necessary to turn the oil off immediately the engine stopped. Therefore, one of Elliot's jobs on landing was to turn the oil off when the motor stopped. As I had him in my arms, staggering down on the floats, he turned to me and said, "Don't forget to turn the oil off."

Here was a man, suffering agonies, hardly able to breathe, and yet he could remember to tell me to perform the routine necessary to maintain that aircraft!

I had to lay Elliot down on the mud bank and get him some cotton wool from our first-aid bag. I did what I could to dress his wounds. There was a hole in his left side beneath the arm, as well as in the arm itself.

I wanted to get a stretcher and ran to a house where the natives closed the door in my face. Just at that moment a launch came along and in it were some officials of the Anglo-Persian Oil Co.

Quickly we went to another native house, and this time I put my foot in the door and took the first bed that I could find.

I think the natives were frightened at the sight of blood, as we had difficulty in

Photograph from Sir Alan J. Cobham

AUSTRALIA ACCLAIMS THE TOURISTS OF THE AIR

Sir Alan's long London-to-Melbourne flight ended, amid scenes of amazing enthusiasm, at Essendon, five miles from Melbourne. Such a mass of people crowded the airdrome, rushed the barricades, and clambered over the plane that only with difficulty was it moved into the hangar.

getting them to help us. Very soon we had lifted Elliot on to the improvised stretcher and had him on board the launch, and ten minutes later he was inside the manager's bungalow, with cool air and all hands working.

The doctor arrived and all that could be done was done. It could not have been more than an hour and a half after the accident that Elliot was in the hospital and all help possible was being rendered. Then I turned to my machine, which had been towed up into a backwater near the Air Force depot in Basra.

### THE MYSTERY SOLVED—A BULLET

The commanding officer asked me to relate the experience and I told him exactly what had happened, and before I finished my story two young officers left the room. Soon they returned and asked me to follow them down to the machine.

"First," they asked, "why should a gas pipe, with no pressure in it whatsoever, burst?"

I couldn't imagine how it had occurred.

Then they pointed to a hole in the side of the cabin and told me to look inside, and when I climbed on board and inspected the inside wall I pulled out a mail bag and a dispatch case, each of which had been drilled by a missile.

It suddenly dawned upon me that we had been shot at and that it was not a burst gas pipe that had wounded Elliot. A bullet had passed through the side of the cabin, through the mail bag, through the dispatch case, right through the gas pipe, then had entered Elliot's left arm, shattering the bone, passed on into his left side, pierced both lobes of the left lung and finally buried itself in his back.

We had been shot at by an Arab and the noise of the explosion that we had heard had been the firing of the gun at close range.

I received an order from the Air Force directing me to go out to the airdrome, about 20 miles away, so that on the following morning, at dawn, I could lead a

Photograph from Sir Alan J. Cobham

GLIDING DOWN OVER WESTMINSTER BRIDGE

As a wild goose, weary from long hours on the wing, the author's plane ends its Melbourne-to-London flight, a journey of 28,000 miles.

squadron of airplanes to the place where the tragedy had occurred.

About 12 o'clock that night there was a telephone call from the hospital. When I answered it I could not understand, or, at least, could not believe what the operator was telling me, and so handed the receiver over to the commanding officer, who slowly repeated the words: "Elliot passed away at 11:45."

The news was a terrible shock to me, for I had no idea that he would succumb to the wounds.

### THE ARAB ASSASSIN IS CAPTURED

I waited until 4 a. m., and then, as dawn came, we took off, and by retracing my route of the previous day I came to the spot where I felt sure the gun had been fired.

One of the officers, who was in another machine, on a signal from the commanding officer, landed. He ascertained from a local encampment what tribes had been there the previous day. That started the investigation which resulted in the ultimate capture of the culprit, who later confessed, his only excuse being that he wouldn't have committed the crime if he had had any idea that he was going to be found out.

Some of these tribes have been in the habit of raiding the villages in that part of the world for centuries, but recently they have had their activities curtailed by the Royal Air Force. Thus many have no love for airplanes, and this, I suppose, was the animus back of the action.

After this terrible tragedy, which meant the loss of one of the world's finest aircraft-maintenance engineers, I did not want to continue the flight, but cables received from England, especially those from Sir Samuel Hoare, Sir Charles Wakefield, and from my wife, all expressing sympathy, urged me to proceed. I decided that I would complete the job.

The Air Force sent me a substitute mechanic, Sergeant Ward, of the Royal Air Force, who was serving with his squadron near Basra. And so, a fortnight later, we continued the journey.

HOME AGAIN AFTER ANOTHER FLIGHT HALF AROUND THE WORLD

Sir Alan Cobham quits his seaplane on the Thames and climbs the stone steps to the Houses of Parliament.

Owing to the lack of sunshine beyond Iraq, we found it difficult to get any aërial pictures on the Australian flight, and it was not until we arrived in Java that we met with regular sunshine.

I shall always have a vivid memory of our arrival in Melbourne, where more than 150,000 people had gathered to meet us. It was with difficulty that we could find space enough to get down on the air-drome, for we had changed over from a seaplane to wheels on arrival at Darwin, in northern Australia.

If it had not been for the police and the Australian Air Force I shudder to think of what might have been our fate had the enthusiastic crowd got hold of us.

### TORRENTIAL RAINS IMPEDE RETURN TO LONDON

The homeward journey, when our craft was once more converted back to a seaplane, was beset with difficulties, especially when we were caught in the monsoon storms in the region of Victoria Point. Here the rain fell five inches a day, and at times it was impossible to see more than 20 yards ahead. Whereas the rainfall in England averages about 30 inches over the twelve months, the annual rainfall along the Burma coast, where it all comes within a period of about five months, is anything up to 300 inches!

At last we got back to London, and ended our 28,000-mile flight of survey by landing on the Thames opposite the Houses of Parliament.*

I look forward to the day when it will be possible for all mankind to enjoy the delights of flying such as have been my privilege during the past seven years.

* See, also, "From London to Australia by Aëroplane," by Sir Ross Smith, in the NATIONAL GEOGRAPHIC MAGAZINE for March, 1921.

# THE GREAT FALLS OF THE POTOMAC

By Gilbert Grosvenor

THE rock-hewn gorge and magnificent falls of the Potomac River are the most striking scenic features in the vicinity of the National Capital. The broad, calm stream that flows by Potomac Park, separating Washington and Virginia, narrows suddenly above the city. Its shores change from bottom lands and gently rolling hills to take on the sterner aspect of palisades, cut at frequent intervals by deep gullies, through some of which small streams enter the river in tumultuous cascades.

On the Virginia side, where the cliffs rise almost sheer from the water's edge, these ravines are so steep and so numerous that a journey along the bluffs entails more travel vertically than in a horizontal direction.

Just above the ruins of the old Aqueduct Bridge, which formerly carried a canal across the river, the trio of jagged rocks known as The Three Sisters recall a romantic legend of the Red Men who once roamed these rugged shores.

According to the tradition, these rocks mark the place where the three daughters of an Analostan chief were caught in a whirlpool and dragged to their watery grave. They were paddling across the river, so the story goes, to a secret tryst with their Powhatan lovers on the Virginia shore; but the river demons intervened and, after accomplishing the destruction of the sisters, caused the three gloomy rocks to rise from the spot where their bodies sank beneath the waves.

The Virginia and Maryland shores converge rapidly as one journeys up the river, until a few miles above Washington they are separated by less than 100 feet of water, now swift and turbulent.

Above Little Falls, which is a series of rapids, the river widens again. Numerous islands spangle the Maryland shore, while Virginia's cliffs become wilder and more rugged. The waters pursue a more leisurely course here, but it is only a temporary calm before the storm, and 15 miles above the Capital they gather for a majestic plunge over a wall of granite which all the Potomac's ages of work has been unable to wear down.

These falls offer a scene of impressive grandeur. Heaps of rocks are scattered about — enormous granite bowlders and jagged reefs of gneiss—as if some Titan of long ago had vented his wrath by upheaving the crust of the earth itself. The wildness of the place, as the waters churn and boil in their never-ending warfare with the rocks, is comparable only to some of the larger mountain canyons of the West, and is hard to conceive as being within a few miles of the Capital City.

Normally the river here tumbles through a rather narrow channel in its race for the Chesapeake, but when spring melts the mountain snows and deluged valleys pour their overflowing streams into its upper reaches, the falls become a swirling flood that rages from shore to shore with a roar that may be heard for miles.

The old Chesapeake and Ohio Canal, which paralleled the Potomac from Georgetown up to and on beyond the falls, was begun about the same time as the Baltimore and Ohio Railway, and there was once a keen rivalry between them for the freight traffic between Washington and Cumberland. But the "iron horse" outdistanced the faithful, plodding mules of the towpath, and the canal is no longer in operation.

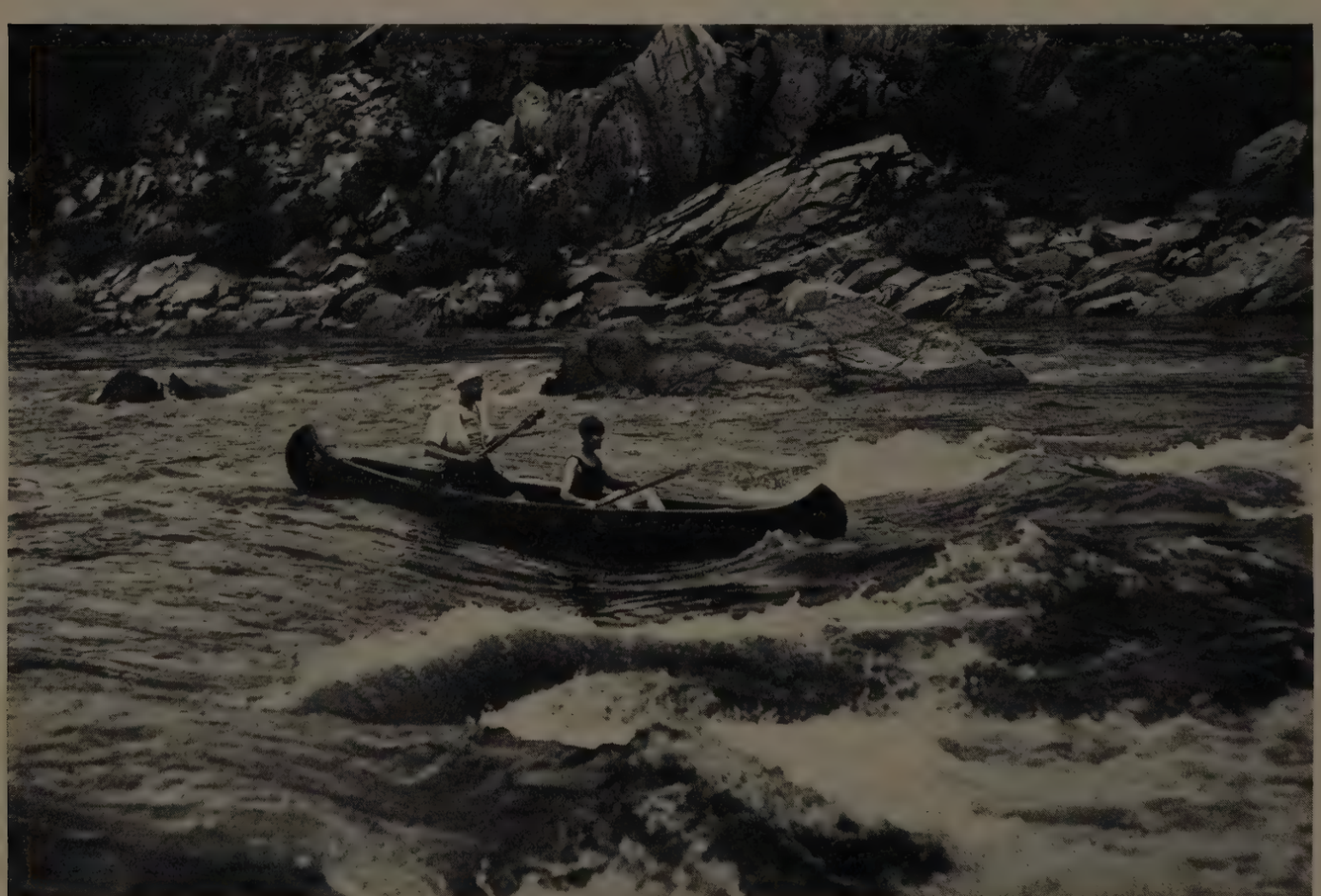
However, transportation's loss has been the gain of thousands who know and love the hike along the towpath, with its great trees and thickets fringing the still waters of the canal, while here and there a moss-encrusted rock, bolder than the rest, juts out like some miniature Lorelei.

Birds frequent the vicinity in countless thousands. Wrens, sparrows, warblers, thrushes, and myriad other varieties haunt the thickets. Kingfishers seek their prey along the water's edge. Mocking birds are permanent residents of the woods, and the cheery whistle of the lordly cardinal may be heard at almost any time of year. Indeed, at certain seasons this magnificently caparisoned songster is encountered in flocks.

Where Cabin John Creek comes down to the river, man has carried a road across the precipitous valley on one of the world's largest single spans of masonry.

BREASTING "WHITE WATERS"

Summer holidays find many of the bolder spirits among the canoeists shooting the rapids in the main gorge of the Potomac, a short distance below the falls. Bathing suits are the usual costume, for spills are not infrequent.



Photographs by Clifton Adams

THE POTOMAC GORGE PROVIDES THRILLS APLENTY FOR THE PADDLER

Great submerged rocks here produce strange, swift currents and high swells or "thank-you-ma'ams," which sometimes cause canoes to jump completely out of the water in going over them.

THE STRAIGHT AND NARROW PATH TO THE FALLS

This swaying bridge leads over an arm of the river to an island on the Maryland side, from which a good view of the cataract (pages 388-389) may be had. The veteran of river and canal who collects the tolls also makes fish nets.

Photographs by Clifton Adams

AT AN ANCIENT SPRING

The old Dickey House near Great Falls has survived the better part of two centuries. Its floors and ceilings are of hand-hewn planks, and its scarcity of windows reflects the period of open fireplace heating. Near by is a spring of clear, cold water.

Photograph by Clifton Adams

THE GREAT FALLS OF THE POTOMAC AT LOW WATER

These falls, only 30 minutes from the White House by automobile, form one of the greatest cataracts of our Atlantic watershed. The preservation of these falls and of the Potomac gorge below is one of the basic features of the project which has been prepared by the National Capital Park and Planning Commission, in compliance with the instructions of the Congress, "to develop a comprehensive, consistent, and coördinated plan for the National Capital and its environs in the States of Maryland and Virginia, . . . to preserve forests and scenery in and about Washington, and to provide for the comprehensive, systematic, and continuous development of park, parkway, and playground systems of the National Capital and its environs."

Photograph by Clifton Adams

COMPARATIVE CALM SUCCEEDS THE FURY OF THE FALLS

The scenery along the Potomac River between Great Falls and Georgetown is extremely diversified, varying from the frenzy of the cataract itself, through the lesser tumult of the Little Falls, to broad and almost unruffled stretches a few miles below. There are places along the river within a few miles of Washington that are almost as wild and rugged of aspect as the canyons of the West.

Photograph by Clifton Adams

THE POTOMAC CUTS ITS GORGE THROUGH WALLS OF ROCK

Through a solid mass of gneiss and granite rock the river flows between palisades that rise in places nearly a hundred feet above its swift-flowing waters.

Photograph by Clifton Adams

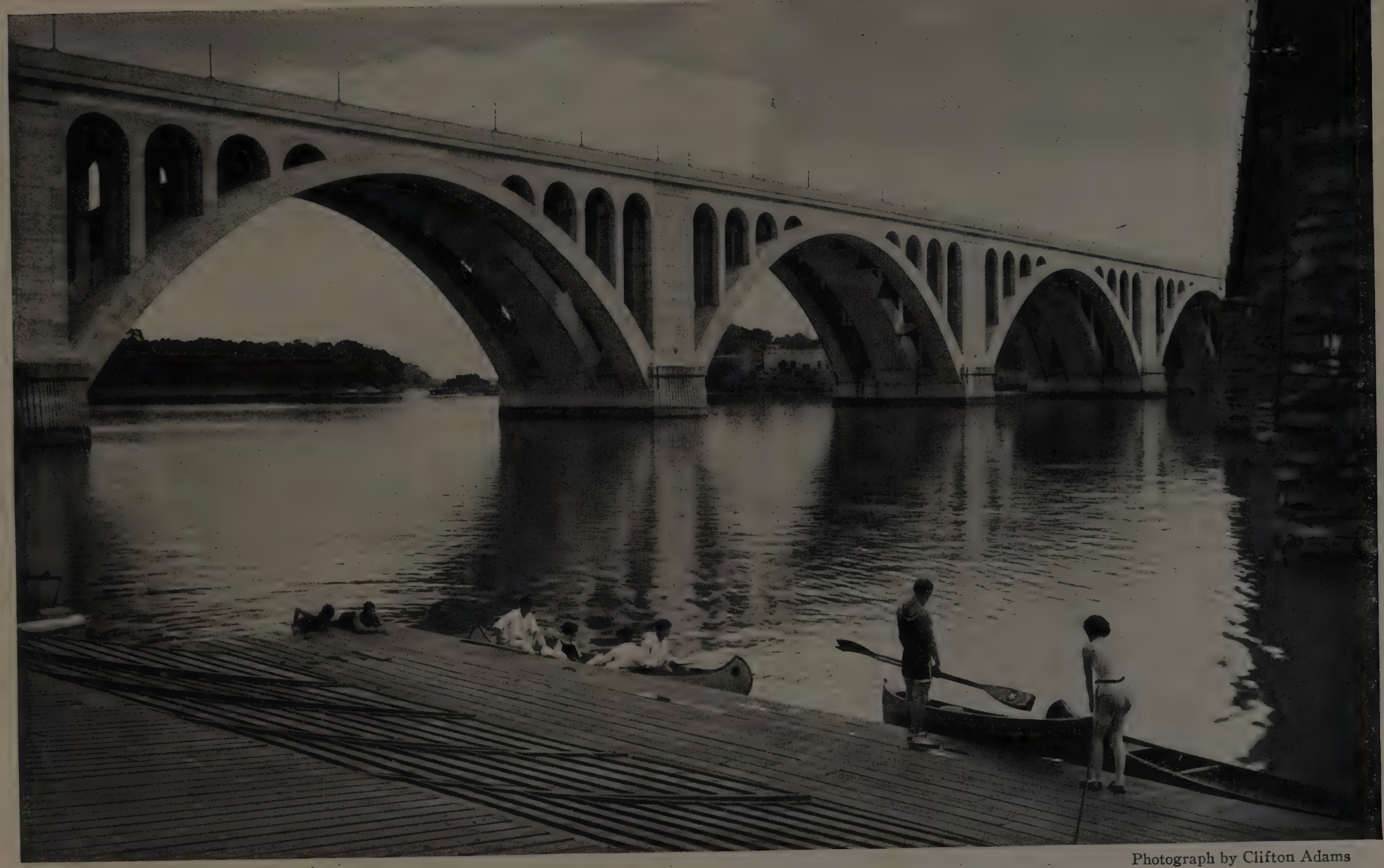
CITY DWELLERS FIND REST AND RECREATION ON THE RIVER'S BROAD, CALM STRETCHES

Thousands of Washingtonians find relief from the summer heat on the cool waters of the river. There are numerous islands above the city which provide, along with both the Maryland and the Virginia shores, excellent camping facilities.

Photograph by Richard H. Stewart

CANOEISTS SPEED THEIR FRAGILE CRAFT IN THE SHADOW OF GEORGETOWN'S STATELY SPIRES

On the heights above the Potomac stands Georgetown University, founded here even before Congress selected the banks of the Potomac as the site of the Nation's Capital. Along the river shore in the vicinity are boat and canoe clubs which sponsor annual regattas and encourage water sports of all kinds.



Photograph by Clifton Adams

GREAT ARCHES SPAN THE POTOMAC AS A MEMORIAL TO FRANCIS SCOTT KEY

At the northern approach to this imposing structure once stood the house of the author of the Star-Spangled Banner. The bridge is 1,456 feet long and has seven spans of from 83 to 208 feet. Through the nearest span may be seen Analostan Island, and the middle arch reveals a bit of the Virginia shore. In the foreground is the Potomac Boat Club, off which the water is nearly 40 feet deep.

BOATS ONCE PASSED WHERE FLOWERS NOW BLOOM

Long before the Revolution, farsighted men in Virginia and Maryland saw the advantages that would accrue if the Potomac were made navigable above Georgetown. George Washington was president of a company organized in 1785 which built a canal around Great Falls on the Virginia side. This is the remains of one of its locks.

Photographs by Clifton Adams

A COMMERCIAL HIGHWAY BECOMES A PLEASURE PATH

Fifty years ago a considerable volume of traffic passed along the Chesapeake & Ohio Canal between Cumberland and Georgetown. Now only canoes navigate short stretches of its drowsy course.

KNIGHTS OF THE PADDED POLE TILT FROM CANOES

Using long, light shafts padded on the end, in lieu of lances, and canoes as steeds, modern mermen emulate the knights of old in tilting tournaments. Their armor, however, is a bathing suit, for one or both of them will surely receive an involuntary bath in the course of the encounter.

Photographs by Richard H. Stewart

DRIVING HOME THE FINISHING THRUST

There is considerable skill and technique in canoe tilting, and not the least part of a team's success depends upon the ability of the paddler to keep his boat straight and steady. The man handling the pole stands on a small platform in the bow

THE SABBATH IS NOT FORGOTTEN AMONG THE RIVER CAMPERS

Many persons who have to work in Washington all summer move their whole families to tents and shacks on the banks of the river above the city, where they live through the hot months. On Sunday mornings they attend church under the trees.

Photographs by Richard H. Stewart

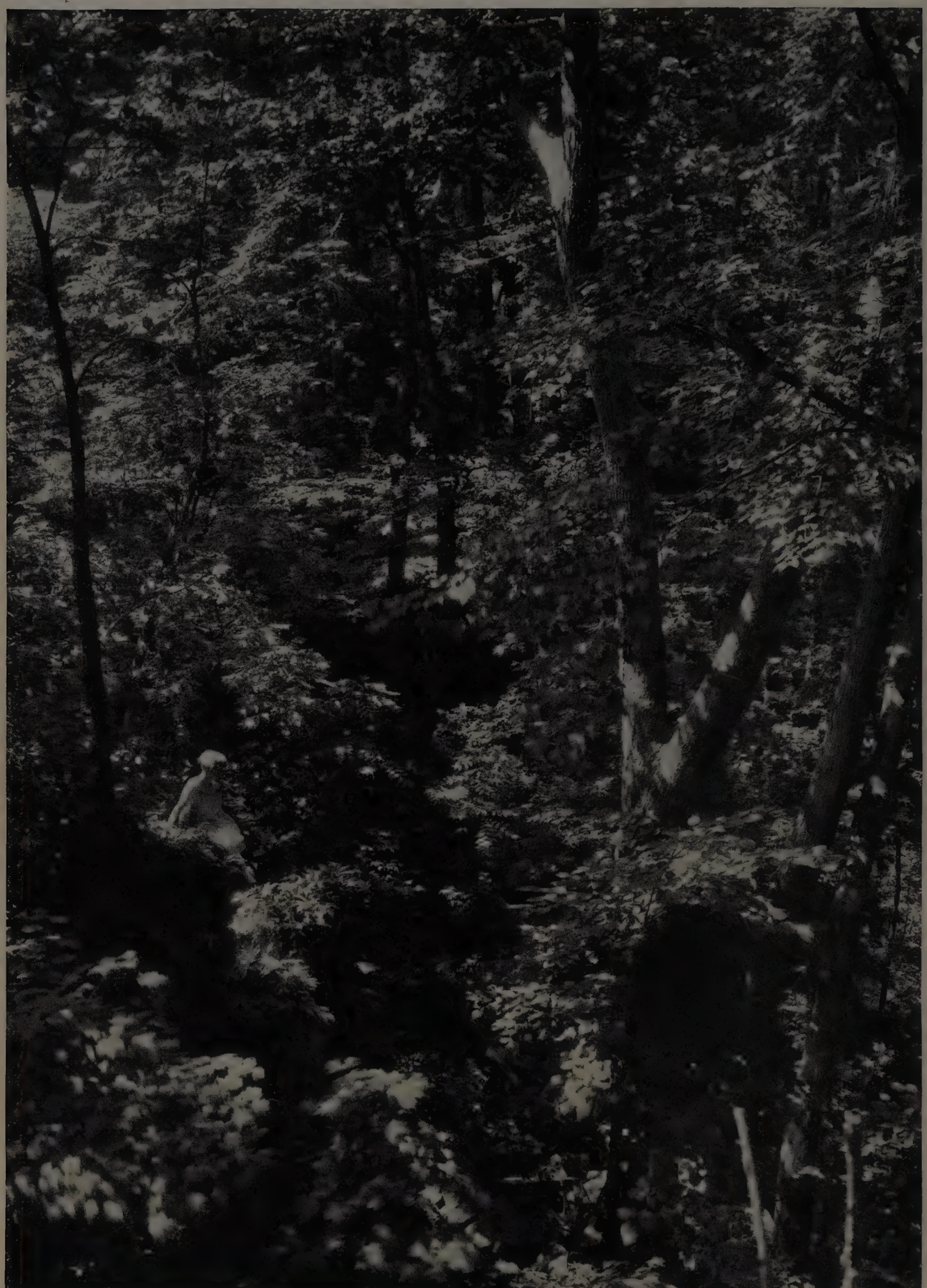
SPRUCING UP FOR OFFICE

Many a white-collar worker snatches his morning shave at the river's edge before paddling down to Georgetown to get the car for his desk. Few great cities are so situated that their people may enjoy the pleasures and benefits of camp life during the summer and still continue to work regularly.

Photograph by Clifton Adams

A POSSUM DINNER IS IN EARLY PROSPECT

Along the wooded shores of the river above Washington many small animals are still quite plentiful. Mink, muskrat, weasel, skunk, raccoon, and opossum are all trapped and hunted there. When cooked with sweet potatoes, Br'er Possum makes a succulent morsel.



Photograph by Clifton Adams

LEAF-FILTERED SUNSHINE BATHES AN ISLAND RETREAT

Plummer Island is unique in many ways. It is a bit of virgin land where hundreds of species of new flora and fauna have been discovered. No less than 290 articles have been published describing its biological treasures (see page 385). This area of 11 acres is the outdoor laboratory of the Washington Biologists' Field Club.

Photograph by Richard H. Stewart

WOOD NYMPHS VISIT A POTOMAC SPRING

On the Virginia side of the Potomac River above Georgetown there are a number of private camps. A granite company controls the shore of the Potomac at this point and until recently allowed campers a sort of squatters' sovereignty. This is one of the springs in the campers' haven. Everyone has free access to this water jar of Nature.

In the springtime, however, this valley itself is of far greater interest than its bridge. Ferns and wild flowers adorn it in profusion, and the delicate pink blossoms of the laurel and notched white flowers of the dogwood dapple the greening hillsides harmoniously.

One of the many interesting features of the Potomac gorge is its peculiar situation biologically. In the cool shadows of its steep cliffs the fauna and flora of the upland regions impinge upon those of the coastal plain to provide one of the most engaging and productive fields for biological study in the East.

Plummer Island, in the river above Cabin John, for more than 25 years has been in the possession of the Washington Biologists' Field Club and has served as a station for the observation of wild life (see page 398). An amazing number of new species of plant and insect life has been discovered on this island and every precaution is taken to protect it from depredation and to preserve its value as a natural biological laboratory.

Despite the fact that the river is mostly very swift in this part of its course, there are areas of calm water which are the summer haunts of numberless canoeists and swimmers. The bolder spirits among the devotees of the paddle venture beyond, to shoot the rapids and receive both thrills and spills for their temerity.

The National Capital Park and Planning Commission has a definite program to save this region of truly magnificent scenery as one of the show places of America. It recommends that the Federal Government acquire the entire gorge from the top of the Virginia bluffs to the hilltops in Maryland and from Georgetown to and including Great Falls. This area would then be supplied with foot and bridle paths, highways, and boat landings to make all of its scenery easily accessible.

The Commission would exclude power dams from the area, as it states they would "destroy the chief scenic values of the Great Falls and Potomac gorge," and, furthermore, are not necessary, because "adequate power may easily be otherwise obtained at a reasonable cost."

The value of this region to the City of Washington and to the whole Nation is hardly possible of expression. It is estimated that 150,000 visitors come to Great Falls each year on the Virginia side alone, while many more thousands take advantage of the better highway facilities available along the Maryland side.

Whether or not the gorge of the Potomac shall become a National Park rests with Congress, which must authorize its acquisition before the Park and Planning Commission can proceed beyond the boundaries of the District of Columbia. Certainly it could in no way be more useful to the Nation than in its natural state—a place of rare beauty and a joy forever to the rapidly increasing population of the Washington district and the ever-swelling, never-ending stream of visitors to the National Capital from all over the world.

Probably no other capital city in either hemisphere has scenic assets comparable to Washington's Great Falls and the Potomac gorge. The late Viscount James Bryce, Ambassador of Great Britain to the United States and staunch friend and admirer of America, in writing of the beauties of Washington in the NATIONAL GEOGRAPHIC MAGAZINE, said:

"It is impossible to live in Washington and not be struck by some peculiar features and some peculiar beauties which your city possesses. In the first place, its site has a great deal that is admirable and charming. There is rising ground inclosing on all sides a level space, and so making a beautiful amphitheater between hills that are rich with woods.

"Underneath these hills and running like a silver thread through the middle of the valley is your admirable river.

"The Potomac has two kinds of beauty—the beauty of the upper stream, murmuring over a rocky bed between bold heights crowned with wood, and the beauty of the wide expanse, spread out like a lake below the city into a vast sheet of silver.

"No European city has so noble a cataract in its vicinity as the Great Falls of the Potomac—a magnificent piece of scenery which you will, of course, always preserve."

Those who rejoice in the unusual scenic environment of the Nation's Capital feel that Oliver Goldsmith's solicitude on a certain subject might well be paraphrased in behalf of Great Falls:

> A scenic wonderland, the Nation's pride,
> When once destroy'd can never be supplied.

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# HOLIDAYS AMONG THE HILL TOWNS OF UMBRIA AND TUSCANY

By Paul Wilstach

TO NEARLY every one Italy is at once a land of memory or promise, of delights experienced or longed for. The very names ring and sing, symphonic in suggestions which beckon and invite. They are panoramic with incomparable visions of Nature and art; they are processional with emperors and popes, tyrants and criminals, saints and mystics, painters and poets and builders, every type of human agent of bad and good, best even and worst. How pleasant and pregnant the ear finds such phrases as the Seven Hills of Rome, the Plains of Lombardy, the Bay of Naples, the Canals of Venice.

Among such phrased names belong the Hill Towns of Tuscany and Umbria. Most of those who have journeyed between Rome and Florence have seen little more than the silhouettes of Orvieto and Chiusi and Arezzo, all skyward on their rocks. When opportunity offers, the byways lead some, however, up one or the other valley of these lower Apennines, to loiter in Assisi or Perugia or Siena. Other than these, the hill towns here are scarcely more than names or pictures seen in passing.

That it was so with me brought the suggestion to climb to Narni and Spoleto, Trevi and Spello, San Gimignano and Certaldo; to add a third dimension to the mere length and breadth of what had been only flat pictures seen only in perspectives.

In this idea of seeing a side other than the outside of these hill towns, I had great comfort from the final desperation of an American friend. All her life she had traveled to and from New York City by the New York Central, on the Hudson's east bank. Once, late in life, she made the journey on the other shore, and declared that she had great relief in "seeing the backs of things she had always seen the front of before."

## A TOWN IN THE SKY ON THE PATHWAY TO UMBRIA

Narni is found hovering over the chasm of the River Nera just above its union with Father Tiber. The enfolding forest-clad hills are already Umbria. They sit in silence, looking only at one another. Life would surely suffocate here if it were not for the long arms of valleys which at times reach in and push these hills apart to make room for snatches of Eden.

On its summit, in a natural cloister of mountains opening only eastward, where such a smiling valley spreads a little for the eight miles to Terni, Narni is a modest but authentic introduction to the smaller Umbrian hill towns.

Trains deign to stop at Narni, but the time-tables do not always pause to record the hours of arrival and departure. Indeed, the town is so far in the sky that passers-by on the iron road may be quite unconscious of its existence, much less its significance, and from the car window spend their entire interest on the single lofty arch, which remains to suggest the superb bridge the Emperor Augustus here

Photograph by Alinari

NARNI PERCHES ON A LOFTY HEIGHT FAR ABOVE THE NERA (SEE TEXT, PAGE 401)

On one side of the town the cliff falls sheer away to a ravine through which run river and railway. On the other sides, while the descent is much less precipitous, it provides a stiff pull. Narni was captured by the Romans 300 years before the Christian Era and the Emperor Nerva was born

Photograph by Alinari

ONLY A SINGLE ARCH REMAINS OF AUGUSTUS CÆSAR'S BRIDGE NEAR NARNI

Sixty feet high and made of great cut stones fitted perfectly without mortar, one of the three arches of the old Roman bridge across the River Nera has withstood the vicissitudes of nearly two millenniums. The bridge was of prime importance in the days of the ancient empire, for it carried the Via Flaminia from Rome, safely across the river floods, to the Umbrian cities and to the north.

Drawn by A. H. Bumstead

A MAP OF ITALY, WITH A DETAIL (UPPER RIGHT) OF THE UMBRIAN AND TUSCAN HILL TOWNS

From Rome the author traveled by train to Narni, on foot to Terni, and thence by motorcar to Spoleto, Trevi, Foligno, Spello, Assisi, and Perugia, along the shores of Lake Trasimeno, beneath Cortona and to the south of the Chianti Mountains to Siena; thence northward to Colle, San Gimignano, and Certaldo.

raised between mountain flanks to unite the broken ends of the Via Flaminia (see page 403).

This superb fragment so seen does not, however, suggest any part of the spell it works when visited in a silence and solitude broken only by the tender singing of the torrent underneath; whether one finds it grave and suggestive at the twilight of evening or dawn, or brooding and mysterious under the high coasting clouds of a moonlit night. Then, though its broken reach cannot bridge the torrent even, it seems indeed to bridge the centuries. So seen, it is easy to understand why this lofty stone remnant has for ages been regarded as one of the noblest relics of imperial times.

The town itself has played a rôle in history; it has its art treasures and it has contributed its quota of great personages. It has had its share of the advantages and disadvantages of its strategic position on the road to Rome.

Photograph by Emil P. Albrecht

ORVIETO, ISOLATED AND IMPREGNABLE

Because of its strategic and unassailable position atop a rock that rises 600 feet from the surrounding plain, this small city was an important stronghold in the turbulent Middle Ages. Near the city are many ancient Etruscan tombs.

### A VISIT TO THE BIRTHPLACE OF TWO TACITUSES

The Emperor Nerva here first saw the light, as later did Pope John XIII; Galeotto Marzio, gallant captain of sword and pen, and Gattamelata, generalissimo of the Venetian Republic, whose valor inspired Donatello in 1447 to model his now famous statue, to be seen in Padua before the Church of Il Santo, the first equestrian monument which had been made in bronze since antiquity (see page 407).

From Narni we walked to Terni, at the other end of the valley, and it was the more friendly for its consideration in remaining at the foot of the mountains and not requiring the tribute of a climb. It is rather modern, after Narni, and in no way so picturesque; but it scores on other points, uniquely as the birthplace of two Tacituses, one the emperor and the other that historian who has been the plague of so many Latin lessons.

As to the spots, much less the houses, where these twin immortals were born, modern Terni places no restraint on the searcher's imagination.

Photograph by Alinari

MARMORE'S CASCADE IS ONE OF THE LOVELIEST WATERFALLS OF EUROPE

Near Terni the River Velino plunges almost 700 feet into a beautiful rocky glen to join the brawling Nera. It accomplishes this descent in three leaps, the first of which is a 330-foot drop from a tree-bordered cliff into a rocky caldron, whence it rushes over huge bowlders and through narrow gorges to make a truly exquisite picture (see text, page 414).

Photograph by Donald McLeish

PADUA DOES HONOR TO A VENETIAN HERO

The statue of Gattamelata, general of the army of the Republic of Venice from 1438 to 1441 and a native son of Narni (see text, page 405), is by Donatello and was the first great piece of bronze cast in Italy since classic times. It was completed and set up in 1453. During the World War it was removed to Rome for safety.

Photograph by Florence Craig Albrecht

AN AQUEDUCT THAT HAS SERVED ITALY FOR THIRTEEN CENTURIES

Built originally by a duke of Spoleto early in the seventh century, the magnificent bridge running between the town and near-by Monte Luco serves the dual purpose of bringing water from the mountain and providing a roadway across the intervening ravine. Donkeys have not yet been replaced by motor power along this route.

Little here, indeed, seems very old except deep in its roots. Anyone drifting back to Terni, say from the seventeenth century even, would recognize nothing except the strange newness of his still lovely Church of St. Francis, the Bernini façade of the Romanic cathedral, and the medieval gate on the side toward Spoleto.

In a town that seems superficially so modern, I came with surprise on a well-preserved relic which, in view of the swift march of progress, seemed indefinitely old in certain features of its out-of-dateness. It greeted me from the shelf of a tobacco shop, where it stood, alone of its kind, among the rolled and twisted and papered weeds, the salt boxes and match boxes of a typical little purveyor of the Government's monopolies. How came it to wander into such company? And how long ago? It was an English guidebook to this central belt of Italy, printed in 1843! We went out of that shop together and sat down in the piazza to open an acquaintance.

In matters historic and artistic the modern guidebooks are but its echo. It has its piquancy from its full and practical treatment of all the machinery of travel when central Italy was the Papal States and ecclesiastics sat in all seats of civil administration, and, too, when the steam railway had not yet penetrated the peninsula, and as well from its practical statements of what a traveler needed most to know of the inns and their reputation, of the direction and condition of post roads, the length of the posts, the price of cabriolets and carriages, and of horses and postilions, and of the points where extra horses, and oxen even, were needed and found to lift the vehicles over the hills.

Turning, for a practical test, to the information as to the inns of Terni, I found that, in 1843 as now, the Europa was its most conspicuous tavern. Having enjoyed its present hospitality, it was reassuring to know that nearly ninety years of landlords had maintained its standard, for the old guide notes it as "very good." It was,

Photograph by M. K. Penrice

IN THE SHADOW OF AN ANCIENT ROMAN GATE AT SPELLO

While this hill town of Umbria, seven miles southeast of Assisi and three miles north of Foligno, has many interesting ruins dating back to the days when it was known to the Romans as Hispellum, its chief treasures are the superb frescoes of Pinturicchio which adorn the walls of its cathedral.

Photograph by M. K. Penrice

TAKING THE FAMILY PIG FOR AN AIRING IN SPELLO'S MARKET SQUARE

The number of its saints and holy men has earned for the region round about Spello, Assisi, and Perugia the sobriquet "Galilee of Italy." Its quiet, pastoral beauty is reflected in the work of the Umbrian school of painters.

Photograph by M. K. Penrice

THE FRUIT AND VEGETABLE MARKET OF SPELLO

Photograph by Hans Hildenbrand

"A FLOCK OF SHEEP THAT LEISURELY PASS BY"

Peace has succeeded the tumult and discord that so long distracted central Italy. Such roads have often echoed to the tramp of soldiers' feet and the ring of steel, but now the shepherd and his flock have only the hurrying automobile to fear.

© M. K. Penrice

OXEN PLOWING IN THE OLIVE GROVES BENEATH THE BASILICA OF ST. FRANCIS

Within the walls of this structure at Assisi (see, also, Color Plate XVII) is one of the richest collections of medieval art in Italy, containing among its many treasures several works of the master painter Giotto. Some of the surrounding olive trees are older than the church itself (see, also, text, page 427)

OUTDOOR MERCHANTS OF SPELLO

AT SPELLO'S PUBLIC FOUNTAIN

Photographs by M. K. Penrice

© M. K. Penrice

ASSISI BUYS ITS POTTERY IN THE SHADOW OF THE ANCIENT SHRINE OF THE GODDESS OF WISDOM

Probably the most interesting relic that remains of the earlier days of Assisi is the Temple of Minerva, which has been converted into the Church of Santa Maria della Minerva. According to legend, it was built about 700 years after the Deluge.

perhaps, not unnatural to wonder for how many other generations—centuries, maybe—this spot at least, if not the building, has been dedicated to hospitality.

### THE CASCADE OF MARMORE WON BYRON'S ENTHUSIASM

The most interesting feature about Terni is, however, outside it, an easy walk up the narrowing glen of the Nera, where is found the cascade of the Marmore.

A Central African whose trail crosses the Zambezi below the Victoria Falls could no more be expected to marvel here than could those guides who daily fatten off honeymooners at Niagara. But Europeans go into rapture before it, for here they find themselves in the presence of one of the highest waterfalls on their continent. In three uneven breaks it leaps over a precipice nearly seven hundred feet high (see page 406).

Photograph by V. Onslow

A CONSIGNMENT OF WINE FOR ASSISI

For longer than man can remember, the dwellers in the hill towns of central Italy have hauled their supplies up from the plains in heavy carts drawn by oxen.

Photograph by M. K. Penrice

TRAVELERS REFRESH THEMSELVES AT ONE OF ASSISI'S PUBLIC FOUNTAINS

The piazza on which the Cathedral San Rufino faces is practically the only large level spot in Assisi. The town is built on a hillside, with the Church of St. Francis at one end of the main thoroughfare and that of his disciple, St. Chiara, at the other. Almost midway between them lies this piazza, high above which towers the ruin of a medieval castle.

Photograph by M. K. Penrice

HER FORBEARS HAVE DRAWN WATER FROM THIS FOUNTAIN FOR CENTURIES

In the days of Assisi's glory this was one of the principal gathering places for the housewives of the city. The absence of modern plumbing does not impress the native as such a serious handicap, in view of the conveniences of the public fountains and laundries (see, also, page 418).

Photograph by V. Onslow

A FRANCISCAN MONK AT THE CARCERI, ASSISI

When in search of rest and quiet, St. Francis often came to this hermitage, perched high among the bare rocks of a ravine on the mountain side. It was transformed into a Franciscan monastery in the fourteenth century.

Lord Byron devoted one of his many Italian ecstasies to this waterfall, and even in his more restrained mood he judged it "worth all the cascades and torrents of Switzerland put together: the Staubbach, Reichenbach, Pisse Vache, Fall of Arpenaz, and so on are rills in comparative appearance."

### ONE OF EUROPE'S HIGHEST WATERFALLS IS ARTIFICIAL

But neither the Marmore's height, nor volume, nor beauty would seem to commend it to curiosity in the same degree as does the astonishing fact that Nature never intended or placed a waterfall on the face of this precipice. The whole fabric is artificial!

This, its really distinguishing feature, I found on the spot thus set out by my new-found guide of 1843:

> "The formation of the cascade was the work of the Romans. The valley of the Velinus [a tributary of the Nera from the East, flowing down past the hill town of Rieti] was subject to frequent inundations from the river, which was so charged with calcareous matter that it filled its bed with deposits, and thus subjected the rich plains of Rieti to constant overflows from the lakes which it forms at that part of its course. The drainage of the stagnant waters produced by the occasional overflow of these lakes and of the river was first attempted by Curius Dentatus, the conqueror of the Sabines, B. C. 271. He caused a channel to be made for the Velinus, through which the waters of

Photograph by M. K. Penrice

EVEN ASSISI'S LAUNDRY TUBS ARE FAR REMOVED FROM THE PROSAIC

Here, as in most Latin countries, the public washing place, under a cool, lofty arcade, provides an opportunity for an exchange of those social amenities which are characterized the world over as "gossip," thus lightening the drudgery of the scrubbing board and the pounding rock.

Photograph by M. K. Penrice

ASSISI ADHERES TO MEDIEVAL WATERWORKS

Italian cities have always had an abundance of fountains, thanks in large measure to the engineering skill of the Romans, master builders of good roads and great aqueducts. Many communities to-day have constructed and maintained their present water systems upon the foundations laid down by the ancients.

Photograph by Hans Hildenbrand

UMBRIAN TRANSPORT

> that river were carried into the Nar [Nera] over a precipice hundreds of feet high."

The train carries one on to Spoleto in three-quarters of an hour, tunneling under Monte Somma; but, other than walking, an open car on the open road is the way best to come close to the spirit of the Umbrian hills.

While resolving these facts over a coffee in the piazza at Terni, and wondering how best to accommodate ourselves to them, an opportunity came to us in the person of a chauffeur, remembered now only as Mario. After carrying a party down to Rome, he was driving his car empty back to Florence, and he made a price and promises which left no other alternative than to book with him. He provided his share of the diversion.

The memory of Italian hill towns visualizes them as seen from the valleys, outlined against the sky, beckoning from above and perhaps more ethereal for it, and exacting the deference of a climb, but, like all precious things, a little more precious for the difficulty of attainment. This is why it was so much more surprising to approach Spoleto as we did.

The swift run up the valley of the torrent of the Tescina, where once brigands made travel exciting in the days of posting, over the heights of Somma two other two thousand feet below the tip of thousand feet above the sea and yet an- Monte Fionchi, and then a little way down the Torrent Tessino, brought us to an opening through which we saw Spoleto at our feet and, a thousand feet below it, the long, smiling valley which reaches up to Perugia, but visible only so far as its elbow, where Foligno stands.

### WHERE HANNIBAL RECEIVED HIS FIRST REPULSE IN ITALY

One side of Spoleto is five hundred feet above the other, which goes far to explain why everything here seems just above or just below everything else. In the continual turning and twisting of its tiny streets, zigzagging up and down, one senses the pastoral days when here were pastures only and Nature's own engineers, the cattle, with their instinct for economy of effort in climbing, first laid out the hillside paths. In what historic twilight might that have been?

Far enough, no doubt, for here a city

Photograph by Emil P. Albrecht

THE MEDIEVAL LIFE OF PERUGIA CENTERED HERE

The Palazzo del Capitano del Popolo, later the Palace of the Mayor, was constructed in 1472, and in the piazza before it many of the civic activities took place. The square is now a vegetable market. The varicolored umbrellas and canopies erected by the peasants and the green and gold of their lettuce and oranges produce a distinctly pleasing note against the Renaissance background (see, also, text, page 427).

Photograph by Hans Hildenbrand

ROME'S LEGIONS BOWED TO HANNIBAL ON TRASIMENO'S SHORES

This peaceful lake in the Umbrian hills was the scene of one of the worst defeats ever suffered by Roman arms. On an early summer morning in 217 B. C., the Carthaginians under Hannibal ambushed and practically annihilated the army of the Consul Flaminius. The waters of a little stream

stood three centuries before our era, already so strong that when Hannibal led his mighty legions of men and elephants across the Alps and triumphantly as far as the gates of Spoleto, Livy testifies how here her inhabitants gave the Carthaginians their first repulse on Italian soil. Since then the memory of it has been kept alive by the name of the city's northern gate, the *Porta Fuga,* the Gate of the Flight.

HOME OF LUCREZIA BORGIA

Architectural remarks from Italy's entire history are engraved in the building of Spoleto. There are the ruins of a Roman amphitheater; the house where Vespasian's mother lived, still enriched with its mosaic pavements; a vast detached medieval castle on its own walled hill, once the home of Lucrezia Borgia; history and beauty in the vista at every turn.

Outside the town the hills are wreathed by a whole chaplet of churches, each with its interest, which invites to walks out to them through vineyard lanes and woody paths.

Mario, who quickly revealed himself as being as good a cicerone as he was chauffeur, had advised concentration on the cathedral. But that is obvious advice in nearly every little city on this peninsula, since the *Duomo* is not only its temple, but its museum and its gallery of art as well.

This one in Spoleto is seen first from above and is descended to in order to be approached across a rude neglected piazza whose floor is a quaint rough tapestry of gray brick set on end and faintly green with the undisturbed grass in the crevices between.

The scarred and weathered façade, rising before a rocky spur of mountains, looks as if it were chiseled from it, and as if in entering one would enter a cavern church, as in the ravine of Matera or at Santa Rosalia, on its Pellegrino peak above Palermo.

The features of the façade are its superb arched portico, with open-air pulpits on either side, the balustraded terrace above it, and the upper front blossoming with eight rose windows.

As we approached, Mario made vivid Spoleto's annual gala, when, on Easter morning, the mass is sung in the early spring sunshine, at an altar erected on the terrace above the portico, and devotional crowds pack the piazza and the windows and the roofs all about.

FRA LIPPO LIPPI'S FRESCOES FLOWER IN SPOLETO'S CATHEDRAL

If, within, the nave is stark and bare, it is a properer frame for the apse, which flowers from floor to roof with Fra Lippo Lippi's last frescoes. The church is dedicated to the Virgin, and these paintings gloriously illustrate the Annunciation, the Birth of Christ, the Death and Assumption and Coronation of His Mother.

These are sometimes spoken of as Lippi's masterpieces, but they are now, after five centuries, too much the worse for time, damp, and candle smoke for one to be sure in such an estimate.

The Joyous Friar, as Fra Lippo came to be known by a life of little ecclesiastical reserve, lived his last years here and died in Spoleto. He did not dedicate them unreservedly to work on the choir walls. He did not dedicate them even to the service of a single love. In that respect he was apparently as democratic as he was merry. Tradition has it that one of his ladies was not too forbearing and her relatives registered her and their resentment of his infidelity with poison.

LORENZO THE MAGNIFICENT LEFT HIS TRIBUTE TO THE JOYOUS FRIAR

Spoleto seems not to have loved Fra Lippo less for his frailties, but rather more for the honor it esteemed it that he came to live there and leave his colorful rhapsodies on its cathedral's walls and himself in one of them.

Lorenzo de' Medici came later to take his body off to Florence, but Spoleto refused to give him up, arguing quite logically that Florence had so many great men that it could well spare to little Spoleto its gay painter to continue to sleep where he had laid down his brushes.

Lorenzo was not least the Magnificent in his gesture of renunciation, for in deferring he commanded the erection of the lovely wall tomb from which the round, if not rosy, portrait of the great artist still

Photograph by Anderson

SIENA'S SENTINEL OF THE MIDDLE AGES

The city is closely built and many of its winding streets are like narrow ravines. On the Piazza del Campo, one of the few open spaces within the walls, rises the Palazzo Publico, whose magnificent medieval tower soars high above the roofs of the city (see, also, text, page 432).

Photographs by Emil P. Albrecht

SIENA ALSO VENERATES THE MATERNAL WOLF WHO FED ROME'S FOUNDERS

Legend ascribes to Senius, son of Remus and nephew of Romulus, the founding of Siena. From him the city is supposed to have derived its name and the emblem of the founders of Rome. The column dates from the fifteenth century.

ALONG THIS UNDULATING WAY ONE REACHES SIENA'S CATHEDRAL

Like Perugia, Siena spreads over several hills, and its many rich architectural gems of medieval times are surrounded by narrow, winding streets, with steep ascents, which lend a picturesque charm to the Tuscan capital.

Photograph by Bruni

RIDERS IN THE PALIO TEST THEIR MOUNTS OVER THE COURSE

The day before Siena's big race takes place the ward captains gather in the Palazzo and draw lots for the horses that have been selected for the contest. Then each rider takes his designated steed to the Campo for a practice gallop (see text, page 432).

looks out of its marble medallion toward his last pictures.

The roadbed up this lovely valley leading north from Spoleto is but a top dressing on the ancient Via Flaminia. Near its foot the River Clitumnus springs mysteriously from the Apennine limestone and spreads itself among the willows and poplars of the vale sung by poets from Vergil to Byron and Carducci. Above it stands the so-called Temple of Clitumnus, named by Pliny, brooding over so much beauty with a beauty of its own worthy of any poet-fostered tradition.

But farther on, at Trevi, coned on an eastern hill beneath its aërial campanile, at lofty Montefalco and Bevagna and Spello, and at lower Foligno, the sources of interest advance a thousand years and bring us nearer the figures which seem to have caught and perpetuated the soul of Umbria, for on these hills no church so mean but seems to have its priceless canvas of the famed Umbrian school.

Whatever else these sanctuaries may not have, the shuffling sacristan will be sure to point out a canvas illuminated by Lo Spagna, Ghirlandaio, Fra Lippo, Niccolò da Foligno, Perugino, or Pinturicchio, not yet wrested from the setting for which it was created.

Mario gave a particular interest to Foligno when he told us what the guide neglected, that there we were in the town where was set up and published in 1472 the first printed edition of Dante's "Divine Comedy."

### ON SOIL SACRED TO BELOVED ST. FRANCIS

Yet, as we advance, even this great company gives place to the humble immortal of that city buttressed against the flank of frowning Subasio, to St. Francis and his Assisi. Few who reach Italy from any other part of the earth fail to climb to the convent church which, built to the glory of Francis, glorifies Giotto as well.

Nothing about Assisi disappoints, unless it be the crowds of devotees who rob it of the simplicity and charm still left to other towns in the Umbrian hills.

As usual, the town was teeming with a pilgrimage at the processional hour. By remaining below at Santa Maria degli Angeli we escaped the excursionists and found that church more interesting for being empty or nearly so.

This great and comparatively modern edifice shelters at its center, beneath its dome, another and tiny church within the greater. It is the oratory, called the Portiuncola, founded in 352 by a company of hermits from Jerusalem, and restored in 512 by St. Benedict, and was the meeting place of St. Francis and St. Dominic and the first center of the Franciscan order. At its rear is the cell where holy Francis died and the garden where his thornless roses still blossom each spring.

Standing apart, we were able to observe the pious peregrinations of the only other person in the church, a diligent pilgrim gathering indulgences.

Certain such favors are granted to the faithful for each visit to the oratory of St. Francis. This man, on whose pale face glowed the quiet rapture of a mystic, was nevertheless of so practical and literal a mind that he interpreted a "visit" to mean every entry within the oratory door. So, entering there for a momentary stay, he would return into the great nave a dozen paces, then turn about and reënter for another visit and another indulgence, and kept up this pacing back and forth, accumulating what might appear to be rather more than one man's share of these spiritual favors, throughout the two hours we spent in and about this church. He and his simple piety we thought, however, more in harmony with humble Francis than the herded excursionists processioning in the hill town above.

Toward evening the car bounded forward again, across the Tiber and up Perugia's heights, but, in the midst of searching only smaller towns, not to renew acquaintance with this queenly city of so many jewels.

Only dinner stayed us here. But who can come to Perugia so hungry that he can forego glancing just once more over Umbria from her lofty terrace, that brow of her mountain rock, a thousand feet above the river, where stood the castle whose locked gates withstood the besieging of Totila the Goth for seven successive years! At her feet nearly the whole of her realm stretches out in view at one time.

Photograph by Emil P. Albrecht

ARRAYED IN ALL THE TRAPPINGS OF MEDIEVAL PAGEANTRY

These gaily bedecked gentlemen in the Piazza in front of the Cathedral of Siena represent the *contrada,* or ward, of the Panther in the parade attendant upon the celebration of the Palio, a horse race which has been an annual event in Siena for hundreds of years. They have come for the archbishop's blessing upon banners and horse.

Mario at our elbow, enraptured, was eager to have us say it was the loveliest outlook in all his fair land. And we said it, though I wondered why with mental reservation. Then remembering Sant' Elmo over Naples and the balcony curving about the high brow of Catanzaro, I knew that the scene was held a little this side of perfection by the absence of the sea.

Mario, who furnished ecstasy and information with equal zest and relish, surprised us and quite turned our thoughts from the magic panorama with the sober geographical fact that the spot under our feet was the exact center of the length and breadth of continental Italy.

With dinner well bestowed, we drove on in the early night around the rim of Lake Trasimeno, where Hannibal dealt the Roman his deadliest blow; over the imperceptible barrier from Umbria into

Photograph by Emil P. Albrecht

RED, WHITE, AND BLACK MARBLE DISTINGUISH THE FAÇADE OF SIENA'S CATHEDRAL

This beautiful thirteenth-fourteenth century building rises majestically above the city from a hill where, according to tradition, a temple to Minerva once stood. Certain it is that a shrine to the Virgin Mary has occupied the site for nearly a thousand years. The façade is attributed by some authorities to the master, Giovanni Pisano. The statues are modern copies of the weatherworn originals (see, also, text, page 434).

Photograph by Emil P. Albrecht

AWAITING THE ARCHBISHOP'S BLESSING ON THEIR BANNERS

The representatives of the wards competing in Siena's famous Palio bring both their banners and their horses to be blessed before entering the great race. These men are from the ward of the Snail and their colors are azure, with yellow and red bands.

Tuscany, with a glance toward the shadowy lump of Cortona under the first star as we passed; across the vale of Chiana, into the hills again and into the night.

### SCENES PHOTOGRAPHED BY MEMORY

In the first hours of darkness we reviewed objects we had seen in the valley during the day, but had left unmentioned in the multiplicity of other interests. There was a young mother, a loose cloth draped over her head and shoulders and her babe on her knee, sitting in the shadow of an arch at a roadside *osteria* near Trevi, who looked the Madonna of a dozen altarpieces seen in the Umbrian churches.

There was the long-legged monk behind his panniers of vegetables, astride a mite of a donkey, flecking wisps of dust with his sandaled toes; the dark youths out of the vineyards who strode along hand in hand, scarlet blossoms behind their ears and more buttons on their jackets than a coster; three nuns in blue with flaring white bonnets, who in the sunlight had looked more ethereal than actual; occasional groups of strong nut-brown girls at work in the fields, pausing in firm, graceful poses, laughing-eyed, to watch the passers-by, their heads wrapped loosely in purple or yellow or green or magenta kerchiefs, with an end trailing over the shoulder; and a bent and twisted old hag, limping doubled and leaning on a stick twice

Photograph by Emil P. Albrecht

WEARING THE COLORS OF THE OWL IN SIENA'S PALIO

Strange tricks were sometimes resorted to by the various wards in their efforts to win the great race (see, also, illustrations, pages 428, 430, and 432). One ward secured a wiry little steed that had several times won the race, but as he grew older he was not able to travel at top speed when weighted with a rider. He was equipped with a bridle made of pasteboard, painted to resemble leather, and the rider was given instructions to be thrown as soon after the start as possible. When opposing jockeys tried to catch at the bridle it would break, and thus the venerable steed galloped on to a riderless victory.

her height and looking as if she were old enough to have known St. Francis; yet, as she stopped and turned to let us pass, squinting a smile into her merry old face as she screwed it up toward us.

There were the white oxen, already famed here in Roman days, sleek and slow, with as kindly an eye as ever was fastened in a socket (see pages 412, 415, 417, 420, 434). They are popular because they are stronger than a horse and when they die they can be eaten. These thrifty peasants find a dead horse a dead loss.

Now these oxen fetch and haul and plow; but in posting days they were seen at the foot of the post-road hills and, according to the grade, one or two were harnessed on to the diligences and carriages to help the horses lift them over the pass.

And there were the scarecrows, unlike any other I had ever seen. They were portly effigies, well padded out, healthy, vigorous personages, and strung up so that with every gust of breeze they turned about and swung their arms—very lifelike to a predatory bird.

The restful darkness, the wind created by our swift advance, the soft purr of the engine, finally brought on a sleep from which we were awakened to find it was after midnight and we were at the

Photograph by Emil P. Albrecht

REPRESENTATIVES OF THE WARD OF THE UNICORN WAIT FOR A BLESSING

At one time each of Siena's 17 wards had an entry in the annual race, but the hazards attendant upon so large a number of horses with reckless riders have caused the city officials to limit the contestants to 10 in recent years (see, also, pages 426, 428, 430, and 431).

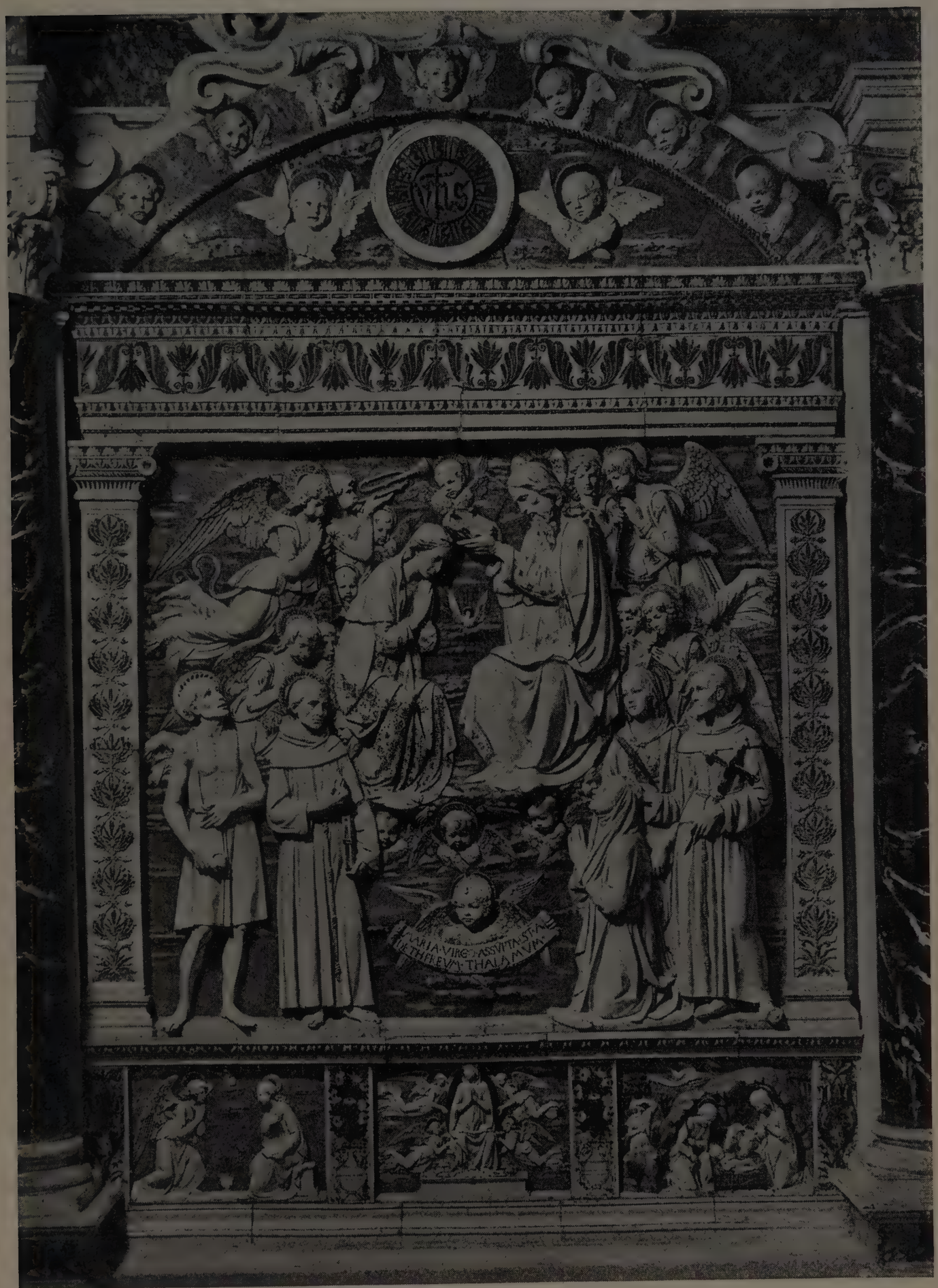
door of our destination, somewhere in Siena (see page 424).

### FIVE OF ITALY'S GREATEST SCULPTORS COLLABORATED IN SIENA'S PULPIT

In the morning this imprisoned city of the Tuscan hills, the city of St. Catherine and of the Palio, welcomed us as might an old friend, familiar and reassuring. There again were the tight little streets, with their frowning early Renaissance palaces, stern yet timidly ornate, the first concession of fortress homes to an elegance still reticent.

There, in its depression, was the semicircular Campo, that tilted piazza on whose rough flags the riders of the seventeen Sienese wards race their horses for the city's flag, the palio* (see pages 426, 428, 430, 431, and 432).

* See "Siena's Palio, an Italian Inheritance of the Middle Ages," by Marie Louise Handley, in the NATIONAL GEOGRAPHIC MAGAZINE for August, 1926.



THIS EXQUISITE EXAMPLE OF DELLA ROBBIA'S ART IS ONE OF SIENA'S PROUDEST POSSESSIONS

The "Coronation of the Madonna," deemed by many the most beautiful work of the master of terra cotta, adorns one of the chapels of the Franciscan Convent of Osservanza. A tiny chapel dedicated to a hermit occupied the site of this church in the early Middle Ages.

Photograph by Hans Hildenbrand

DRAFT CATTLE OF TUSCANY ARE REMARKABLE FOR THEIR SIZE, STRENGTH, AND DOCILITY

Oxen are much preferred to horses as farm animals among the hill towns, for when they have served their usefulness on the highways and in the fields they may furnish roasts for the peasant's table (see, also, text, page 431).

There were the façades made familiar by pens and pictures beyond counting, yet somehow unobserved now in the presence of the slender tower of the Mangia, which rises into the azure with all the grace of flight.

Up this labyrinthine town the streets unwound at its pinnacle into the presence of the Duomo, florid with marbles and mosaics under the morning sun, a sometimes questioned masterpiece. Its vast and shadowy interior, however, satisfies those whom its façade may not, and no matter how many times one returns, it is to linger at nearly every step, but longest before the pulpit, that miraculous 13th century product of the collaboration of five of Italy's greatest sculptors; before the statue of John the Baptist by Donatello, and to trace out those incomparable pavement pictures of *graffito,* delicate outlines etched in the marble, sealed with black stucco, and glowing softly with the patina of half a thousand years.

### A TUSCAN SHEIK

This much of Siena had been revisited at the price of rebellion. Mario had pleaded and practiced speed once too often.

His excuse for keeping out of Assisi

A TUSCAN FARMYARD

The long stalks piled against the wall of the barn are a species of bamboo used extensively for vineyard stakes. The soil of Tuscany is largely cultivated by prosperous peasant tenants.

Photographs by Caroline Robinson

ROADSIDE INDUSTRY IN TUSCANY

In almost any Italian village one may encounter peasant women spinning rope or string with their primitive apparatus. In the little pottery "baskets" on the ground burn tiny charcoal fires for warming the hands, as the season is February.

Photograph by Alinari

THE ATMOSPHERE OF THE DARK AGES STILL CLINGS TO THE CITY OF TOWERS (SEE PAGE 439)

San Gimignano's crumbling walls surround a city much smaller but very like that which Dante knew. In those days a citizen's importance was reflected

was the pilgrim crowd, and crowds indeed are no part of the charm of these peaceful hills.

At Perugia he had allowed us dinner and the vista, and had so drugged our senses with a day of speed that we weakly let him urge us on.

But when, after a refreshing night and Siena to be reseen, he came and asked us to forego this third delight, our wills were stronger, and he was reminded that Siena was in our bond.

He met this with feebly urged extenuation and ready compromise. He said his wife was sick and he must go; he would clip the cost and in mercy proceed alone.

Naturally, every added day on the road with us kept him from another fare. That was understood; but not the wife. After three days with Mario the wife was deemed apocryphal. It was believable that he might lie, but not that he could crown his self-revelation en route with a wife at the end.

At Terni, where he first presented himself, he had left a lady at another table to come and introduce his business. Next morning she was at the car's side to part with him a little tearfully.

When entering the cathedral at Spoleto we had left a lively world outside. When we returned to it the city had completely changed. Doors and windows everywhere were closed. Not an individual was seen in the streets. Not a footfall broke the silence. It was as if a plague had driven every inhabitant out and left a white, sun-baked, deserted leprous town. It was not the plague, however; it was only *pranzo*. The noontime angelus had rung.

Every one had gone in to the midday dinner and siesta and we had the town exclusively to ourselves. When such a town shuts up, it shuts up tight. Shops were closed, wooden shutters were up, metal *saracenescas* were down, the empty ways were flanked only by sealed houses.

Perhaps this would not have been worth mentioning, since it is the daily characteristic of every Italian town, were it not that, leaving the deserted streets to strangers only, it seemed as if Mario might be, as we were, isolated and easy to find. His easy self-effacement was agreeable some hours before, now the noontime housing seemed not to have left him out. At the moment that his absence had become an enigma, however, the reason of it appeared by his side in the deep shadowy recess of an archway—another girl.

He surprised us again with his tenderness at Foligno; but after he had repeatedly proved himself equally at home at each succeeding stop, whether at a roadside *osteria* or inside the towns, we accepted him in his character as Tuscan sheik.

But the memory of his past performances discounted the urgency of his rushing forward to minister to an ailing wife. Hence our rebellion. He got his cash and we our freedom to linger a little with our old inamorata, Siena.

I misdoubted our judgment of our philandering friend at first, and might have continued to, had we not later caught sight of him driving away toward the Porta Camollia. Whatever urge of husbandly duty there may have been in his heart, in the seat at his side was another girl.

### COLLE, HOME OF CAMBIO AND "FIASCO"

So with bags sent forward by train, according to the convenient Italian method, which requires no ticket for them, we found ourselves on the road again, finishing on foot this holiday begun on foot. And the end of the first leg was the village of Colle di Val d'Elsa.

This modest hamlet was the home of the great Arnolfo di Cambio, the architect and sculptor, who designed the Duomo, built the Palazzo Vecchio, enlarged Santa Croce, and designed and built its first cloister, all in Florence; who was one of the famous five who immortalized themselves in the Cathedral pulpit in Siena (see text, page 434), and in other great works left his autograph in stone in many parts of Tuscany.

Colle would seem to have done its part in giving Cambio to the world. But Colle carries on. It gives a humbler but a better-known gift to the world, for here is made the *fiasco*, that round bulbous bottle with the long, slender neck, which, coated in straw and decorated with its knotted cords of red and green and blue, is familiar on every table where one finds *chianti*.

And what more appropriate place for such a fabrication, since lifting one's eyes to the east they here look upon the vine-clad

Photograph by Alinari

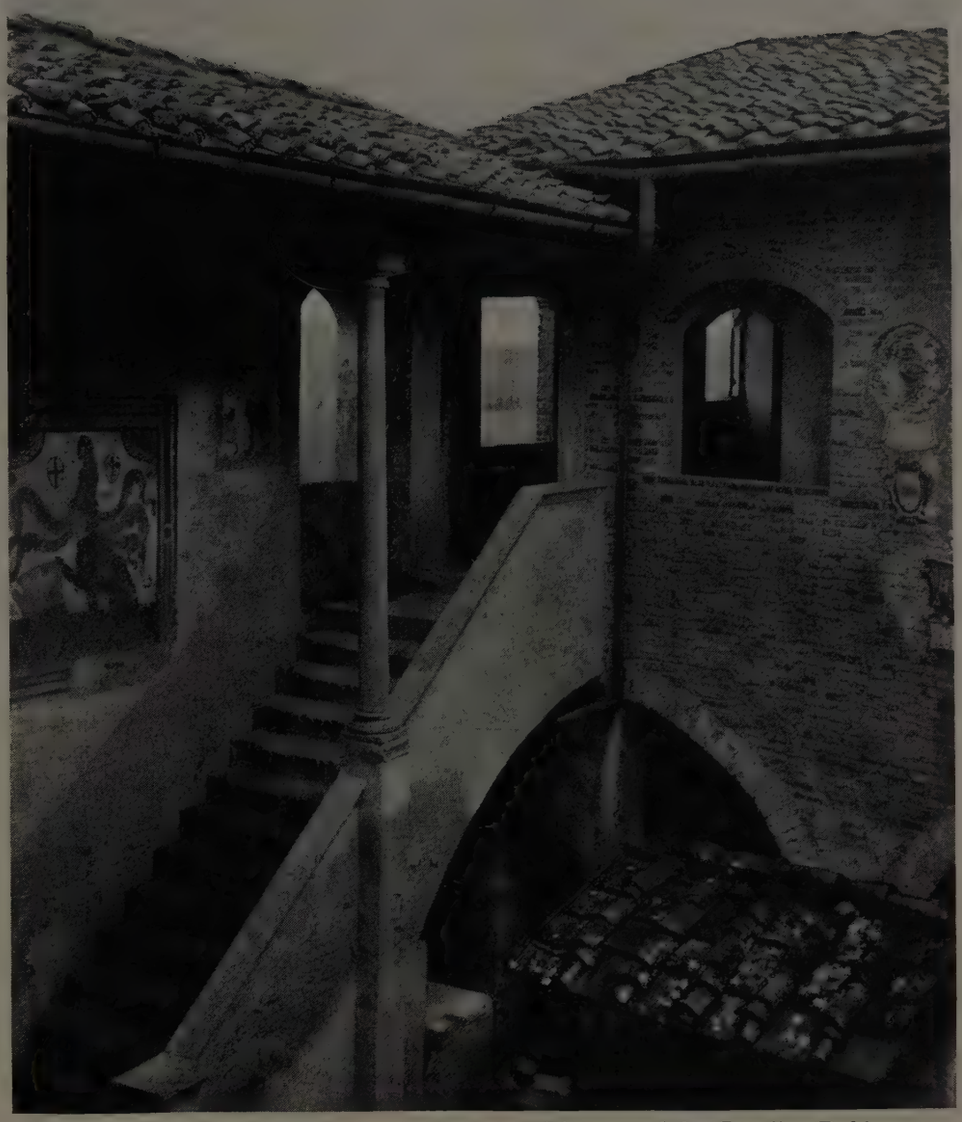
GRIM SYMBOLS OF AN AGE OF STRIFE (SEE, ALSO, PAGE 436)

From tower to tower the traveler progresses about San Gimignano over ramplike streets. Fratricidal war between the nobles espousing the cause of the Guelphs and those favoring the Ghibellines brought about the destruction of the city as an independent republic. Much weakened by these feuds, it fell a victim to the Florentines in 1353.

hills whose red blood carries their name wherever wine is drunk, the Monte Chianti (see map, p. 404).

On the road again, in that quiet and peace which come where no railway goes, amid the sober beauty of fields and orchards and vineyards, of highways and lanes where man and beast walk untroubled, we agreed that neither train nor motorcar permits the intimacy and understanding, and the sense of traveling *in* a country instead of merely over it, that come to one afoot.

Is it that a pause after the speed of motoring leaves one with an inner something still spinning and speeding? Is it that the unrelenting sense of rush rushes one on so that one looks without seeing and without caring much, and that to one so speeded things in mere repose seem nonsignificant? Even the waiting car, oiled and gassed, though with pistons still, appears to fret with a silent, grim, desperate persuasion to be off.



Photograph by Caroline Robinson

THE HOME OF BOCCACCIO STILL STANDS IN CERTALDO

The author of the "Decameron" lived most of his life at Certaldo and died there. He was buried in the church of SS. Michele and Iacopo, under an inscription written by himself (see text, page 441).

### A CLUSTER OF TOWERS PROCLAIMS SAN GIMIGNANO

There is no kinship between one awheel and those afoot. But abandoning the car one is released; one seems to have joined again the brotherhood of these hills. Leisure returns, and with it the eyes and understanding open again, and the beauty and interest of men and things appeal once more. At least so it seemed to me, afoot in the exhilaration of an early morning start from Colle.

The road soon accommodated itself to the hills in broad curves. Near horizons cupped a tiny world. There was a seclusion and a pastoral calm which made eventful the mere flight of a bird. Here seemed the world as it always had been, time uncalendared. Such detachment was a proper preparation of the mind and of the eye for passing through this green, silent corridor at whose end the slopes separated and revealed the vision of the little town of San Gimignano.

One recognizes it instantly on its hill among hills. Its cluster of towers proclaims it. It cannot be any other than San

Photograph from A. S. Riggs

VINCIGLIATA RISES LIKE A DREAM CASTLE FROM THE SURROUNDING WOODS, NEAR FIESOLE

A portion of this feudal stronghold of the Dark Ages dates from 1031. In the middle of the nineteenth century it was restored by an Englishman who

Gimignano of the Beautiful Towers, unique among all the towns of Italy (see pages 436 and 438).

Entering, one finds a medieval austerity in every street and opening. Beauty passed it by, but stamped it, nevertheless, with a grim and noble distinction. Dante came here ambassador in 1300, and to-day he would be more at home in San Gimignano, for he would find it less changed, than anywhere else he knew.

Much has disappeared that once stood here, but, as nothing has been made new, it is only the old that remains. Unlike Carcassonne, it nevertheless, like Carcassonne, transports one back to its beginning.

The exterior of the museum and of the churches gives no hint that within are some of the finest flames of color that the Italian masters translated into story. One visits them and rejoices in them and forgets them. Indeed, of San Gimignano one remembers only its strange, inscrutable towers.

Once one spoke of San Gimignano's "forest of towers" that Dante saw. There then were seventy-six of them; but above the pink tiles of this little town of only thirty-three hundred souls now rise only thirteen surviving towers. There are in all, to be sure, some traces of thirty-seven.

Perhaps the other towers, those which have disappeared, were beautiful. The remnant is scarcely that. The survivals are square, made of unadorned travertine blocks, though sometimes of brick or of both; but they are without decoration, without those graceful windows which elsewhere pierce the campaniles, every opening an exquisite architectural epigram, and without even the decorative cornice which so often crowns other towers with the delicacy of a diadem.

### SYMBOLS OF A SULLEN AND FEROCIOUS AGE

They do not rise in a conventional cincture protecting a girdle of walls. Such walls as San Gimignano may ever have had are gone, and the towers, instead of rising on the line of its circumference, cluster at its center.

Their position suggests a sullen and ferocious age. If they stood at the circumference of the little city, one could envision the townsmen standing shoulder to shoulder to protect themselves, their wives and children and homes, from aggression from without.

Standing where they do, each above its own palace, they can but suggest the terrible period of bloody feuds, family warring against family, house against house, neighbor against neighbor, destroying each other with murderous engines.

A suggestive survival is this obscure and aloof San Gimignano. Not least suggestive at night, even when the moon rides the sky, for the towers hide its face and blacken the narrow, empty streets with shadows. Then the sound of one's own heel on the cobbles seems a signal to an unseen enemy. One feels the immanence of intrigue and ambuscade and sinister attacks, as if at the next moment the silence might be broken by the rattle of armor, the clash of steel, the crash of shields and broadswords.

### THE LAST OF THE HILL TOWNS—CERTALDO, HOME OF BOCCACCIO

One leaves San Gimignano with relief, and yet at the crest of the road over the last hill one looks back at the little cluster of towers with regret, to turn away and make of such a picture a mere memory.

However, in turning, a fair and laughing picture is below and beyond. It is again the little valley of the River Elsa, and on its other side, on the lower hills, where the Chianti Mountains have begun to dip toward the plain through which the Arno flows, enthroned by height, sits Certaldo.

It is our last hill town and another of those which know few visitors. At its feet run the trains bound for Siena; but it rarely gets the tribute of more than a glance from a car window. Though it is made a little pictorial by its position, architecturally it has no boasts. Then why climb to its gates? The answer is Boccaccio.

Paris and Florence dispute with Certaldo as to where Boccaccio was born. This is certain, however, that his family was of Certaldo, that he spent much of his maturity there, that he died there, that he always signed his name *Boccaccio da Certaldo,* and that in his epitaph he named that town as his birthplace.

His name is the great and only plume in little Certaldo's modest bonnet. With becoming pride the citizens flaunt it. He was a part of his own age, and less wicked to it than to a puritanized posterity. The world knows him for a great artist, and Certaldo knew him as not a bad sort, and requited his love.

### BYRON'S ATTACK ON CERTALDO CITIZENS REFUTED

Byron, in his "Childe Harold," fastened a phrase on Certaldo for its alleged treatment of the deceased author of the "Decameron," which has never ceased to nettle its savants:

> Even his tomb
> Uptorn, must bear the hyena bigot's wrong,
> No more among the meaner dead find room,
> Nor claim a passing sigh, because it told for *whom.*

For four hundred years the remains of the father of Italian prose were entombed in the center of the cathedral. His great monument was erected there, opposite the pulpit, early in the 16th century. Boccaccio was represented half-length, holding on his breast with both hands a folio volume on which was written *Decameron.* "A singular book to be placed just facing a preacher and a proof of liberality on the part of the clergy," said M. Vallery, who saw the monument.

This source writer, obviously after another visit, said: "The tomb has experienced the most melancholy changes. For more than four centuries it had been the honor of Certaldo and had attracted many travelers to the Canonica, when, in 1783, it was removed by a false interpretation of the law of Leopold against burying in churches. The hyena bigots of Certaldo, against whom 'Childe Harold' and his annotator declaim, had nothing to do with it."

For years Boccaccio's skull and bones were preserved by the rector of the church, but their whereabouts have been veiled in mystery since that prelate's death.

In 1823 Boccaccio's house was repaired and ever since has been dedicated to his souvenirs. Here to-day one finds his 14th century domestic environment recreated. There also are gathered the fragments of that monument which must have been hard facing for the cathedral preachers (see page 439).

Modest Certaldo makes at least one other artistic gesture. It is the Palazzo Pretorio, a simple Tuscan structure with a stern and unrelenting façade, which had been made to smile by reason of the decorations which succeeding generations have embedded there.

These decorations are Certaldan coats of arms in every sort of setting, placed without order or design or any correlation. The effect is of a plain and prim but consequential old lady who has been forced by friends to wear her medals, and if they do not wholly obscure her they take away her austere aspect.

### BOCCACCIO DEFEATED BY BROCCOLI

It was Boccaccio who made us glad to come to Certaldo. It was broccoli that made us glad to leave—broccoli, that staple Italian green whose feast is the octave or two between late spinach and early peas.

From Narni all the way to Certaldo life reeked with broccoli. The gardens were green with it, and so were the carts and the market stalls and the stools before doorways; it stalked forth from the kitchen for every meal. Its great, coarse, green leaves and white stems came submerged in soup (*al brodo*); it came as a salad, crisp and raw, under oil and salt; it came scalded and limp, as its honest vegetable self, heaped in a huge, inert mass under a lump of butter (*al burro*), to be unraveled like spaghetti, and then, like spaghetti, to be spiraled round the fork for carriage to the mouth.

A sound, hearty dish is broccoli, taken in moderation—that is, taken in not more than two forms at every meal for a fortnight. The escape from it in its more virulent form softened our regret in leaving the lovely, infinitely varied, unforgettable hill towns.

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THE ARCH OF DRUSUS SPANS THE APPIAN WAY

Along this Queen of Roads Roman legions once marched to the conquest of the ancient world. In the days of the Republic and the Empire the highway was bordered with the tombs of Rome's great.

A GLIMPSE OF AMALFI, FROM A GRAPE-BOWERED PERGOLA

This sun-bathed shelf is part of an old Capuchin convent garden now converted into the grounds of a hotel, which is situated high on a cliff overhanging the blue waters of the Gulf of Salerno (see also Color Plate VII).

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GENOA, CITY OF COLUMBUS

Gilded palaces rising tier upon tier have seen galleys give way to caravels, caravels to barques, and these in turn to transoceanic steamers in this great harbor, the busiest of all Italy.

VULCAN'S POT IS EVER BOILING

Until the terrible tragedy of A. D. 79, when Pompeii and Herculaneum were destroyed, Vesuvius was not known to be an active volcano. Since the great eruption of 1631 the cone has seldom been without its rising steam, and often has wrought destruction to neighboring towns.

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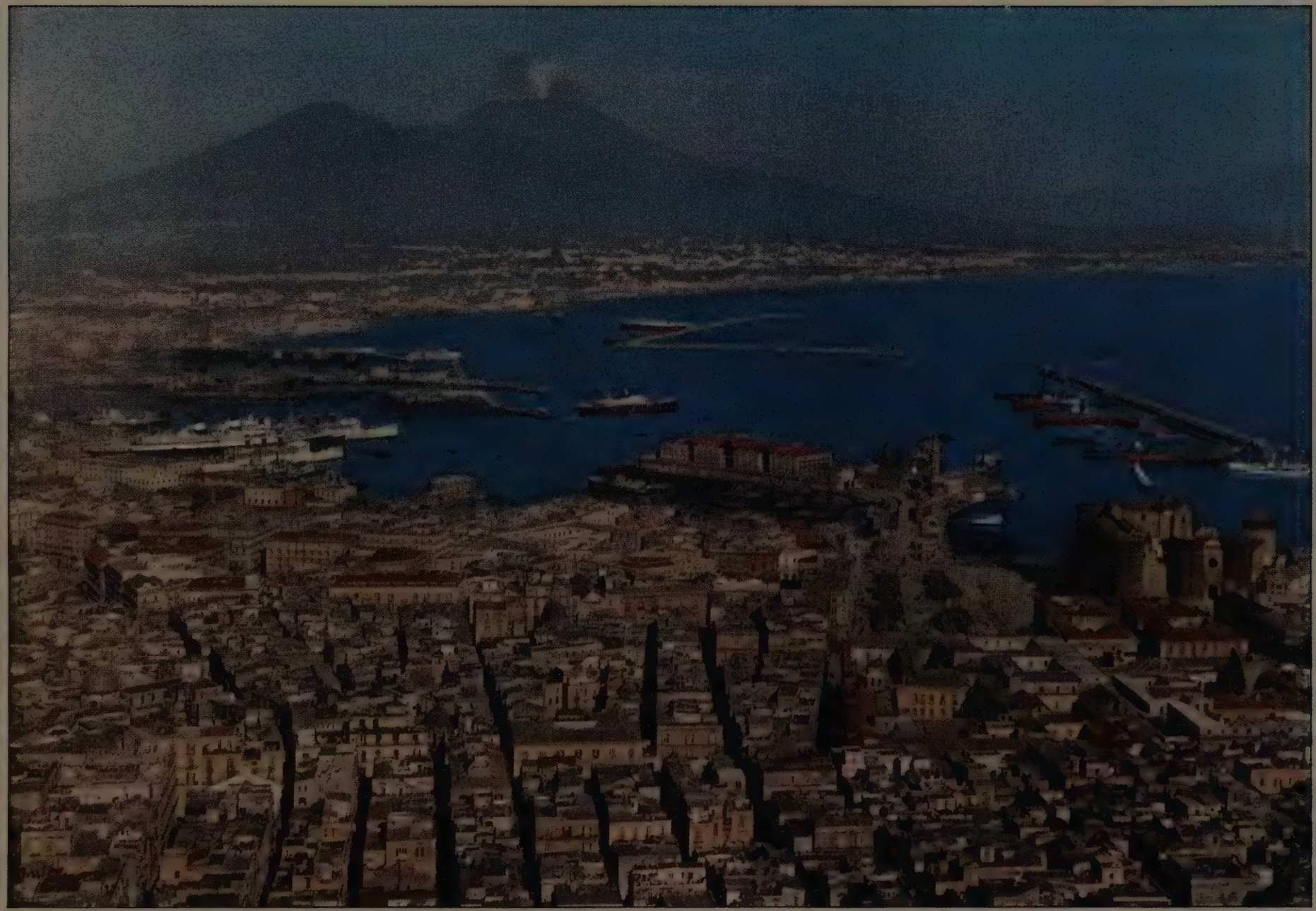
ROSES OF THE ITALIAN RIVIERA

Bordighera's vales are famous for roses. Palm groves, which supply many cities with branches for Palm Sunday and for the Feast of the Tabernacles, have supplanted olive groves in this vicinity.



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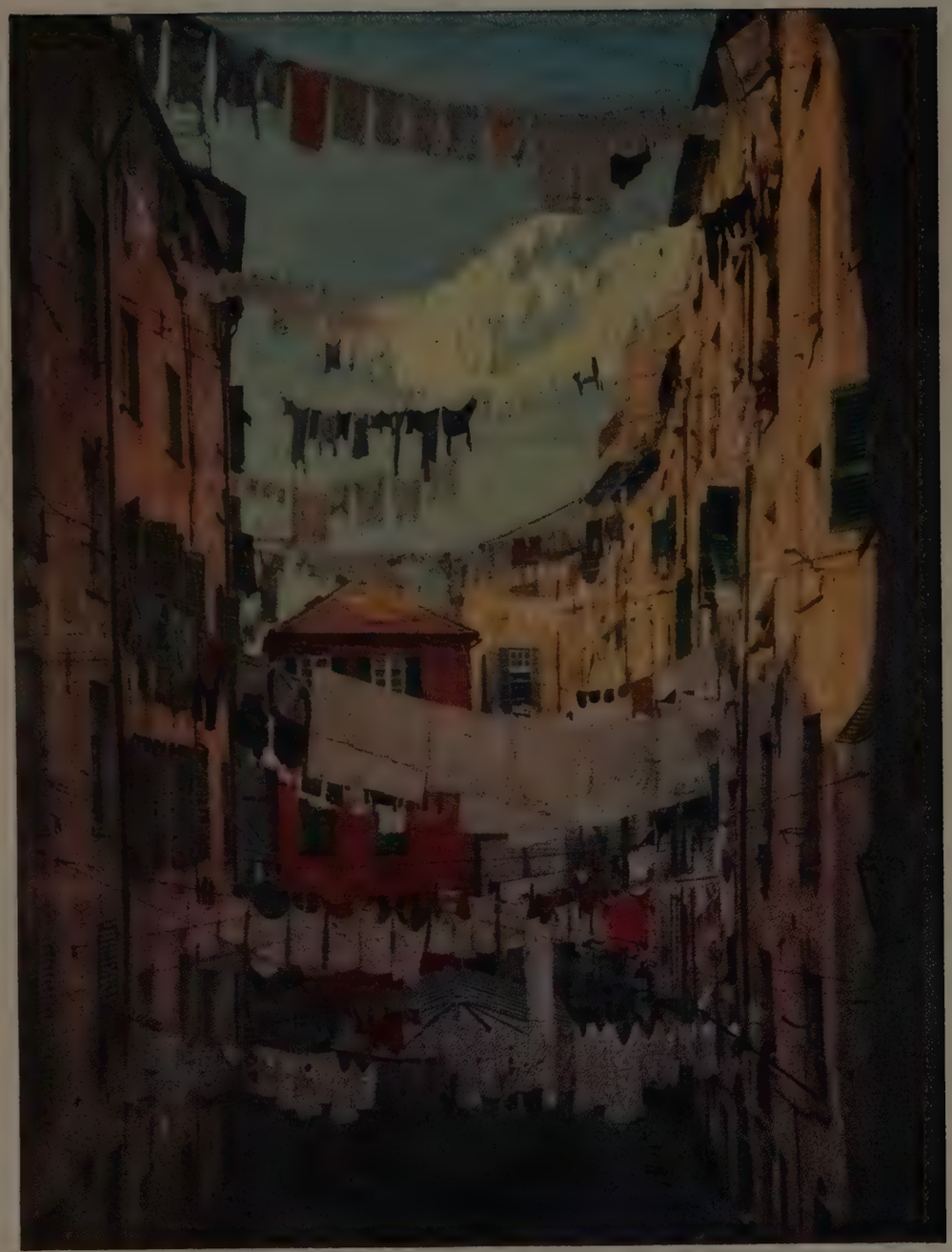
THE BAY OF NAPLES IS A SYNONYM FOR BEAUTY

As if holding a torch to the city's loveliness, flaming Vesuvius, a Moloch among mountains, looms ever threateningly less than ten miles away. It has at times scattered its ashes as far as Constantinople, yet a beneficent Fate has always spared the thriving port, with its teeming thousands (see also Color Plate III).



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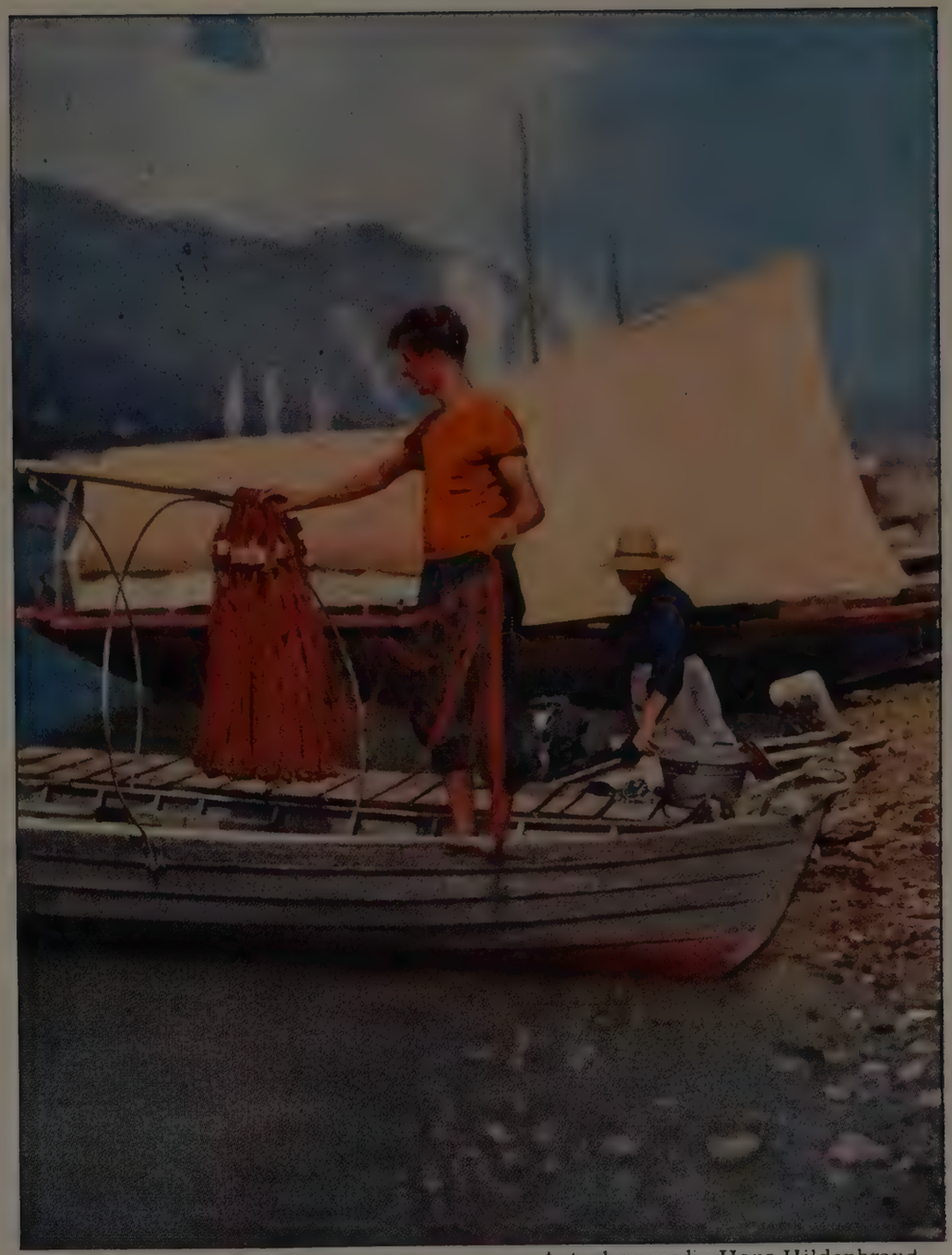
INTIMACIES OF GENOESE FAMILY LIFE



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A YOUNG FISHERMAN OF LAKE MAGGIORE

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ROME'S MAGNIFICENT MONUMENT TO A GREAT KING AND AN UNKNOWN WARRIOR

Erected in memory of Victor Emmanuel II, first king of reunited Italy, this great edifice is also the burial place of Italy's Unknown Soldier of the World War. The structure of white marble provides a majestic background for the gleaming gold-encrusted equestrian statue of the king.

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ITS POWER GONE, AMALFI NOW RULES BY BEAUTY

Once this city of filigree aspect had its Doge, and, as a commercial center, rivaled Genoa and Pisa. Now it is a sun-drenched, sleepy little town, its galley-crowded harbor only a memory. But a constant stream of travelers comes to admire and to leave its tribute to beauty in dollars and shillings and francs.

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A DEFECT THAT HAS BROUGHT ENDURING FAME

The Leaning Tower of Pisa was meant to rise straight from the ground, but sank on one side when only 35 feet high. Then, making a virtue of necessity, its builders continued it in its leaning position. Galileo dropped objects from its leaning side and so evolved the law of the velocity of falling bodies. The tower rises 179 feet and leans more than 14 feet out of the perpendicular.

ACROSS THE ARNO AT FLORENCE RUNS BRIDGE, MARKET, AND ART GALLERY IN ONE

In all the world there is no other bridge quite like the Ponte Vecchio. On each side of the roadway are jewelry shops, while above runs an enclosed passage, its walls hung with portraits, connecting the Uffizi Art Gallery on one bank with the Pitti Gallery on the other.

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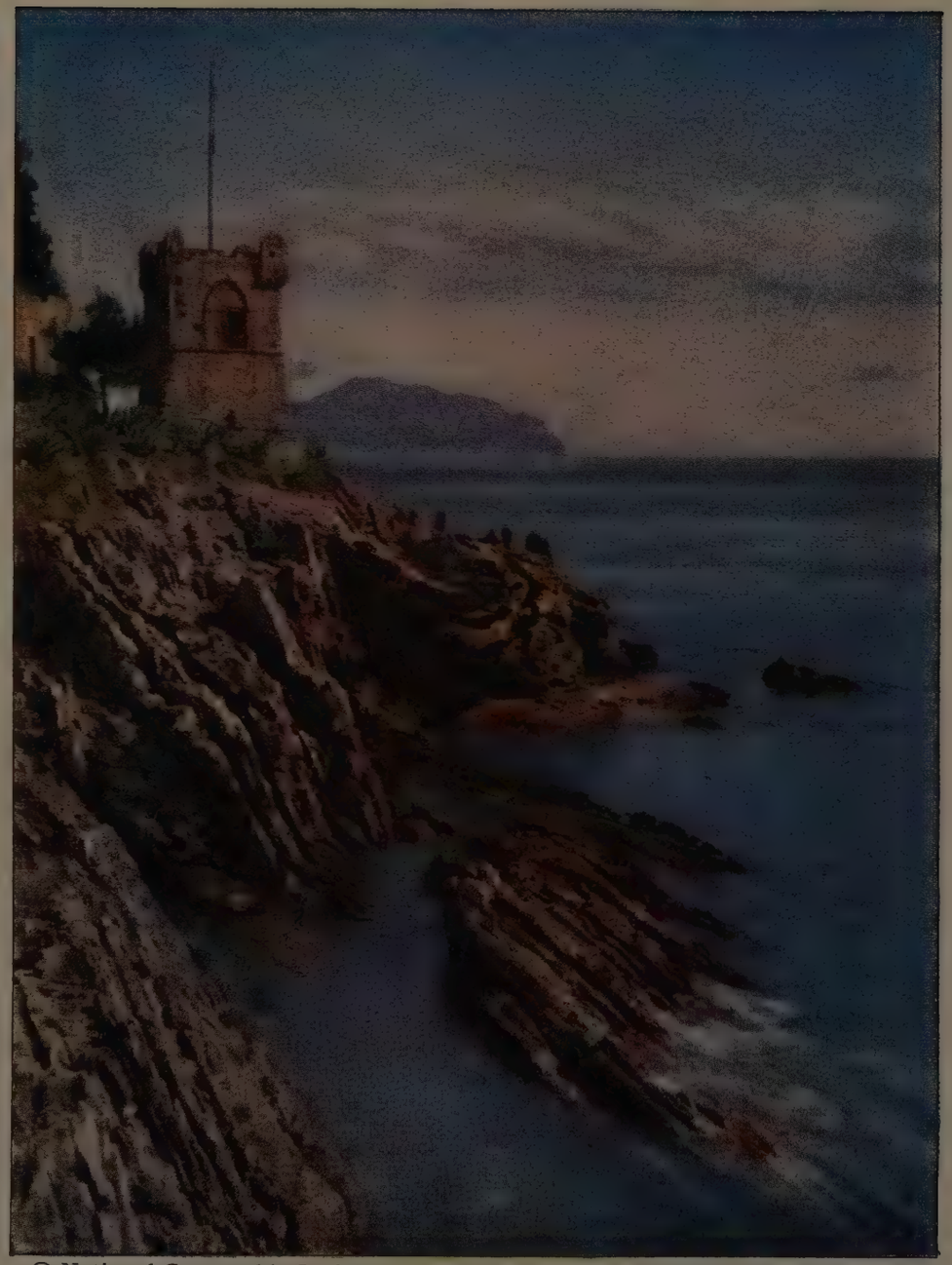
A NOBLE SWEEP OF GOTHIC STAIRS IN VERONA

Learned jurists in flowing robes have often climbed this stairway, for in medieval times the building was the Palace of Justice. This two-toned style of façade spread over Italy from Florence.



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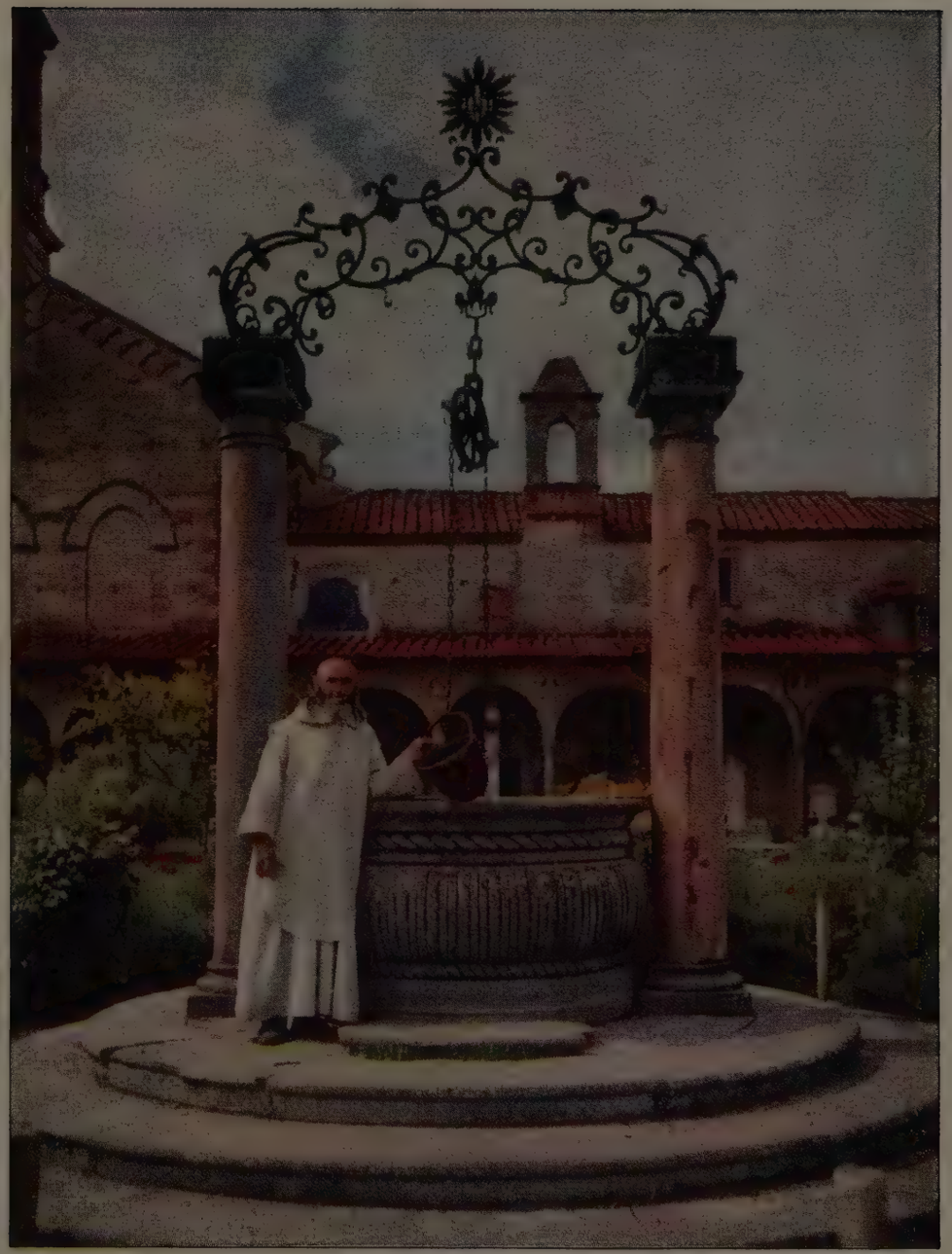
ALONG THE LEVANTINE RIVIERA, EAST OF GENOA

Like eager sea serpents, the grooved rocks climb the precipitous beach at Nervi.



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THE MICHELANGELO FOUNTAIN IN THE CERTOSA

The Certosa del Galluzzo is a fortresslike monastery on the Siena road a few miles from Florence.

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VERONA'S CHIEF MARKETPLACE WAS THE CITY'S FORUM IN ROMAN TIMES

About the irregular Piazza Erbe frescoed walls tell of Venetian influences, a tale echoed by a column bearing a sculptured Lion of St. Mark. The stone canopy, borne by four pillars, was used centuries ago as a sort of election booth.

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WHERE THE ALPS AND MEDITERRANEAN WATERS HAVE THWARTED LATITUDE

Although Bordighera is farther north than Boston, date palms flourish on its warm hillsides and bright flowers ramble over its rocks. This is an entrance to one of the town's lovely gardens.

VENETIAN SANDS CALL TO THE CHILDREN OF MANY CLIMES

The Lido, on the shores of the Adriatic, only a few minutes by motorboat from the heart of the city, is the world-famous bathing resort of Venice.

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FISHERMEN AT WORK ON THE BEACH AT BORDIGHERA

Long before the rose and palm gardens of this Riviera village won renown its humble fisherfolk were taking a comfortable livelihood from the teeming waters of the tideless Mediterranean.

RAVENNA, HAVING LOST HER HARBOR, USES A CANAL

The city which guards the tomb of Italy's greatest poet, Dante, was, in the time of Augustus Caesar, the great naval base of the Adriatic fleet; to-day it is five miles from the sea.

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FARMING SOIL AND AIR NEAR PERUGIA

Among the hills of Umbria and Tuscany, the farmers plant mulberry trees in their fields to serve as living supports for their grapes. Wires connect the trees and in summer the vines hang in long, graceful festoons above grains and vegetables.

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COGNE'S TINY CHURCH IS ADORNED WITH AL FRESCO MURALS

Almost in the shadow of the highest of the Italian peaks of the Mont Blanc group, recently christened Monte Mussolini, nestles this village, a hunting center of the kings of Italy. It was here that Victor Emmanuel II preserved the fast-disappearing ibex by crossing it with the mountain goat.

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Autochrome by Hans Hildenbrand

MEDIEVAL CASTLES REMIND BOLZANO OF HER DRAMATIC PAST

When Italy extended her boundaries to the northeast as a result of the World War, Botzen, the chief commercial town of the Tyrolean Alps, became Bolzano. In the Middle Ages it was the chief depot for the overland traffic between Venice and the cities of central Europe, and from such strongholds as Castle Karneid (right) predatory rulers took their toll of this commerce.

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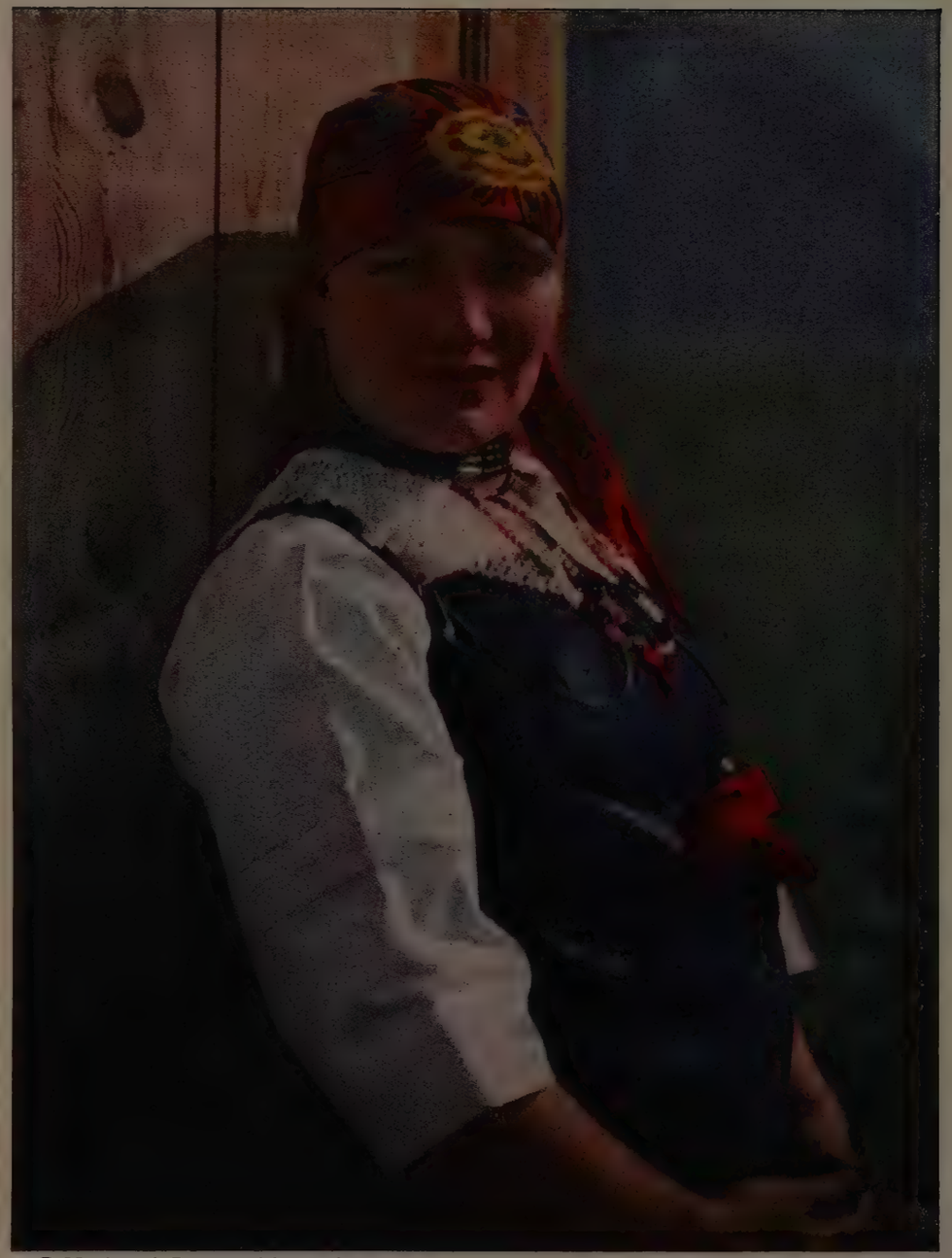
Autochrome by Hans Hildenbrand

ASSISI'S GREAT CHURCH COMMEMORATES THE CITY'S MOST FAMOUS SON

Both the castellated Franciscan monastery and its church are dedicated to St. Francis, beloved founder of the famous religious order. The church is built over the tomb of the great teacher, poet and "brother" to all living creatures. It was begun in 1228, two years after St. Francis's death.



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A YOUNG WOMAN OF COGNE, AMONG THE GRAIAN ALPS

Autochromes by Hans Hildenbrand

A FARMER'S DAUGHTER OF THE SOUTHERN ALPINE SLOPES

© National Geographic Society

Autochrome by Hans Hildenbrand

THE BLUE WATERS OF LAKE GARDA REFLECT THE LIGHT FROM MONTE ORO

Like Riva, less than a mile away, Torbole was in Austrian territory until near the end of the World War. On the cliffs above the village traces of gun galleries still may be seen.

THE CHESTNUT-WOODED VALE OF GRESSONEY, AT THE FOOT OF THE ALPS, IS THEIR HOME

© National Geographic Society

Autochromes by Hans Hildenbrand

A MODEL FOR A MASTER

Wherever the artist's eye turns in Italy, whether in the hill towns or among the plains, by the shores of the Adriatic or the Tyrrhenian Sea, he finds a picture for his color plate.

© National Geographic Society Autochrome by Hans Hildenbrand

PIETY HAS DECORATED THE WALLS OF HER ALPINE CHAPEL

This peasant girl, hedged about by snowclad mountains, comes in contact with the outside world through hosts of tourists who frequent the lovely Cogne valley on walking tours from Aosta.

© National Geographic Society

Autochrome by Hans Hildenbrand

MERANO, ONCE A NATION'S CAPITAL

Before the World War divided Tyrol and gave its southern half to Italy, this mountain-rimmed city was Meran. Until Innsbruck superseded it, in 1420, the town was the capital of Tyrol, and its environs are studded with the romantic ruins of medieval castles.

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Autochrome by Hans Hildenbrand

ALONG THIS NARROW HIGHWAY RODE THE UGLY DUCHESS

The path leads up to Castle Tyrol on the outskirts of Merano (see Color Plate XXII), a famous medieval fortress-dwelling. Many of the castle's legends are associated with Margaret of Tyrol, one of history's ablest but most unsightly heroines.

© National Geographic Society Autochrome by Hans Hildenbrand

SHE BIDS YOU HAIL AND FAREWELL TO ITALY

The charming peasant apron and head scarf which heighten the attractiveness of the young woman of the mountains are familiar to visitors in the vale of Gressoney (see also Color Plate XX).

# A WALKING TOUR ACROSS ICELAND

By Isobel Wylie Hutchison

## I

ON A blustering day of October I stood swaying in a gale high upon the white lighthouse at the Butt of Lewis, Outer Hebrides Islands, and, gazing northward, saw only the piled billows of the green Atlantic. Yet there, 600 miles beyond the mists, lay Iceland, the last outpost of Europe, an island larger than Ireland, whose Culdean hermits, landing upon some rocky islets still bearing their name—Vestmannaeyjar, or Westman Islands—within sight of the snowy peaks of Hekla, more than a thousand years ago, had first carried the torch of Christ to this lonely wilderness of fire and frost and emerald pasture.

For Iceland has been wrongly named, as I heard a traveler remark, gazing across the vivid swards of Fellsmuli (see illustration, page 472) to the black lava slopes of Hekla. "This island," he said, "should have been called Greenland, and Greenland Iceland." To the Hebridean it seems as if it might form but the last bead in the emerald chain of lovely islands which girds the northwestern seaboard of Scotland (see map, page 470).

From that windy moment there awakened in me the determination to visit this far-off island; but when I mentioned the subject some months later to a clerk in an Edinburgh shipping office, you might have thought the place had never been heard of, far less visited by his own ancestors 1,000 years ago.

"Iceland!" he stammered, a kind of startled, frozen look coming into his face at the mention of the word. "Sailings to Iceland! I am afraid we have no particulars." He conferred with another youth.

### BOUND FOR "IC-A-LAND"

At the whisper of the word "Iceland" I saw a grin spread immediately over this fellow's countenance; he turned round to examine me with interest, but could give no very satisfactory information as to how to reach the land of my desire, for the steamers which leave Leith for Reykjavik fortnightly in summer come from Copenhagen and are crowded with Danes.

Strangely enough, despite this easy opportunity, Iceland is still to the Britisher practically an unknown land, and when I tried to obtain a road map of the country I was told that such a thing did not exist, as there are no roads.

It may be imagined how all this fired my desire to visit Iceland, and to explore her afoot, and the end of it was that on a calm July night I wriggled backward through the labyrinth of Leith docks aboard the Danish steamer *Island,* and heard with a thrill, surely as keen as that which pierced the Celts of old when they set out upon their lonely adventure into the far north in the 9th century, the hail of the watchman in his red-lighted tower at the harbor mouth, "Where bound?"

And the answer from our bows, falling clear across the black water in precise foreign English, "Ic-a-land," with the comfortable reply, "Iceland—right!"

The adventure was afoot! Another dream was coming true, as they always will if we have faith enough.

## II

"What! Walking to Akureyri? *Walking!* Then all I can say is, God save you!"

With this parting blessing from an Icelandic gentleman whom I had encountered on the summit of Hekla ringing in my ears, I set out from Reykjavik one bright August morning on my journey of 260 miles to Akureyri, in the far north, where I intended to pick up the boat for home in a fortnight's time and accomplish my design of a walking tour in Iceland.

I had already been nearly a month in the country; had sailed in the *Island* to the west and north coast to Akureyri and back again, visiting the herring fishing stations at Isafjördur and Siglufjördur (see pages 500 and 502); had taken a motorcar to the great plain of Thingvellir (see page 469) and gazed upon the Logberg, where Snorri the priest a thousand years ago appealed to the chiefs to give up their pagan gods and worship the White Christ.

There came one running then with news of a tide of burning lava and the anger of

Photograph courtesy Roger Nielsen

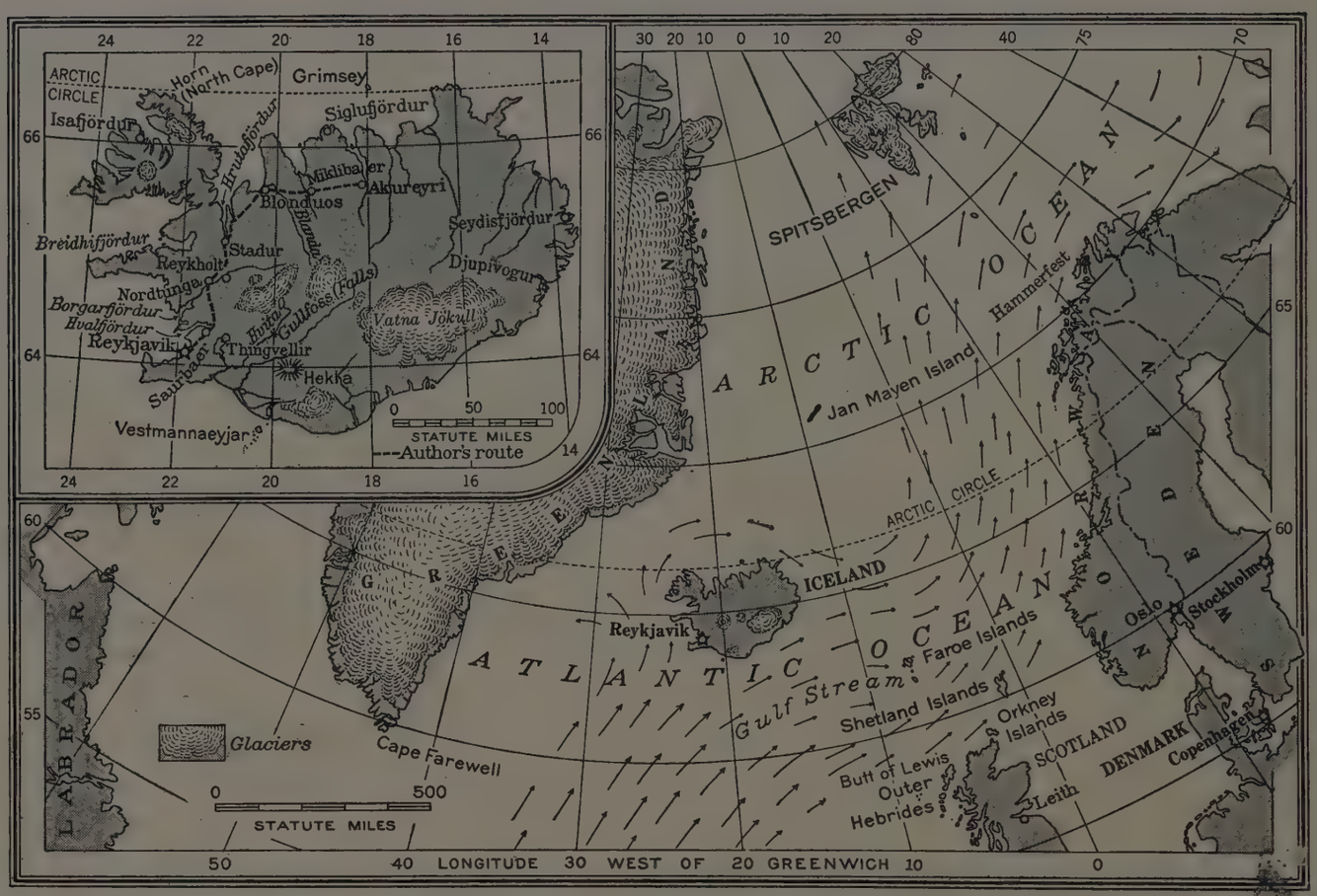
THE MAIN ROAD TO THE THINGVELLIR PLAIN, WHERE THE ICELANDERS HELD THEIR OPEN-AIR PARLIAMENT MEETINGS 1,000 YEARS AGO

Iceland was an independent republic in the days of the Vikings, who held their assemblies on the great plain, 25 miles northeast of Reykjavik. Some of the

Photograph by Herbert Felton

OVERLOOKING THE MOST INTERESTING SPOT IN ICELAND, THE THINGVELLIR PLAIN

One should read something of the old sagas to profit most by a visit to this spot, the open-air meeting place of the ancient government assembly, which played a major part in Icelandic history of a thousand years ago, when the country was an independent republic. It remains practically as it was in the days when the Vikings flocked from all parts of the land to attend the annual Althing, "the assembly of all" (see, also, text, page 467).




Drawn by A. H. Bumstead

A MAP OF ICELAND SHOWING THE AUTHOR'S ROUTE FROM REYKJAVIK TO AKUREYRI

Although the island has an area equal to that of the State of Kentucky, only about 5,000 square miles are inhabited. Some 35,000 square miles of interior Iceland are largely covered with glaciers, lava fields, and sterile sand.

the gods, and for a moment things looked black for Snorri; but with ready presence of mind he pointed to the lava rocks about him. "What angered the gods," he cried, "when this was cast forth?"

For three days Thorgeir, the pagan lawmaker, pondered in darkness with his skin cloak over his head, and then gave it for doom that Iceland should be Christ's.

All this, in vision, I had seen, the background unchanged—in place of the thousand pagans who had declared for the White Christ, the motorcars of a thousand German tourists who had landed that day in Reykjavik from the steamer *München*, on their way to Spitsbergen.

## A MADMAN ON MOUNT HEKLA

I had also accomplished a pony tour of eight days to Gullfoss waterfall, in whose muslin sprays the rainbow ends (see page 482). I had baited the little geyser called "Smidur" (The Blacksmith) with soap till it spouted a jet of white froth fifteen feet or so into the air (see illustration, page 475)—a reminder that in this far northern land the earth still wears her heart upon her sleeve—and had clambered halfway up the wild red slopes of Hekla on ponyback, accomplishing the other half, to the snow-piled crater pocked with dark chutes into the bowels of the earth, on foot, sometimes aided by hands (see pages 472, 473, and 474).

Near the summit of Hekla I met a being as weird as the mountain, a homeless madman, by name Gudmund, who believed that he was forever pursued by three evil spirits or giants. "I am very glad," said the young guide, when we had left this strange solitary behind, "that we have passed this man, for he does not like to meet people."

All this I had done, but I had not yet accomplished a walking tour in Iceland, where such a thing was unheard of, all traveling in the interior being done by pony.

## "NO ONE GOES ON FOOT IN ICELAND"

My ardor had been damped by the first agent I asked at Reykjavik. "To walk!

ALL MEN'S CHASM, NEAR THINGVELLIR

When the Thingvellir lava bed began to settle, many centuries ago (see below), two great parallel rifts, the Almannagja (All Men's Chasm) and Hrafnagja (Raven's Chasm), were formed.

Photographs by Hans Petersen

A CHURCH AND PARSONAGE ON THE PLAIN OF THINGVELLIR

The ancient gathering place of the Vikings is a region of weird beauty. Long before Iceland was known to Europeans, this was a level bed of lava.

© Isobel Wylie Hutchison

A PARTY RESTING ON THE WAY UP MOUNT HEKLA

© Isobel Wylie Hutchison

TOURISTS WHO CLIMB MOUNT HEKLA ARE FAMILIAR WITH THE COMFORTS OF THIS PARSONAGE

Weary of travel by pony or afoot, the Iceland visitor finds acceptable accommodations here at Fellsmuli, when making the journey from Gullfoss (Golden Fall) to the top of Hekla, at an elevation of 4,742 feet (see above).

Photograph by Hans Petersen

ICELAND'S MOST DESTRUCTIVE VOLCANO, HEKLA (SEE, ALSO, PAGE 474)

It is impossible!" he replied pityingly. "It takes many days with ponies and sometimes two or three guides. To walk!" He laughed again.

"You mean between the glaciers. But there is another way, round by the coast; why could I not do that on foot? Are there not farms where I could stay?"

"No, no, it is impossible. There are many rivers to cross. How could you go alone? You must have a guide and ponies, whichever way you take," he said crossly. "No one goes on foot here."

"Some day I should like to go, by myself, on foot," I said stubbornly. "I should hire ponies and guides over the rivers."

"Can you talk Icelandic?"

"Not a word!"

He looked at me earnestly for a moment, his pink face flushing; opened his mouth to speak; then, thinking better of it, laughed again, and, snatching up his Homburg hat, went off to secure prey more worthy of his ponies and his pounds.

I was again in Reykjavik awaiting the boat for home, but still pondering regretfully my frustrated design. It chanced that that morning the French explorer Charcot had arrived in the harbor from the Far North with his ship, the *Pourquoi Pas, i. e.,* "Why Not?" I had heard him lecture, visited his ship, and exchanged a few words with him.

That night I lay long awake in the little wooden bedroom of the Hotel Island, with its coil of rope attached to the window for escape in case of fire. Some undercurrent of thought was at work, preventing me from sleep. "Pourquoi Pas?" The name "Why Not?" was an inspiration itself. "Pourquoi pas on foot across Iceland?"

In the small hours of the morning my mind was made up. I would not sail tamely home in three days' time, having accomplished only the usual tourist's round; I would walk up alone, hiring ponies where needful, from Reykjavik to Akureyri, and catch the *Island* on her next return trip, at the end of August.

The undercurrent of thought had found its legal vent. I fell asleep tranquilly.

### A JOURNEY OF 260 MILES IN 14 DAYS

Next morning I sought out the guide who had planned my Hekla tour. He was a brisk, rosy-faced little man, full of merriment, and encouraged me, though

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ON THE SUMMIT OF MOUNT HEKLA

Iceland is one of the most volcanic regions on earth. Its more than 100 volcanoes, of which Mount Hekla is the best known, have literally thousands of craters, and one lava field covers 1,700 square miles. Hekla has been in eruption 22 times during the last ten centuries.

warning me that I should require ponies over certain rivers too deep to wade, and for certain distances that might be too far for me to walk between the stations he kindly mapped out for me (for no reward save friendship).

In order to catch the boat, I had to accomplish the journey of 260 miles in 14 days. This prevented my doing the whole distance on foot, which, with ample leisure, barring the rivers, would be quite practicable.

The road, or track, rather, for it is little more, despite its black outline on the only portable map of Iceland which I could secure in Reykjavik, runs up the western and northern seaboard, turning inland over a high tableland midway between Reykjavik and Akureyri, till the northern sea stretches a lean arm to meet it at Hrutàfjördur (see map, page 470).

Stefan had suggested that I should spend my first night at the parsonage of Lagafell, only 9 miles from Reykjavik, and cross the mountains by the high, steep track called the Svinaskard (Swine's Pass) next morning. But the day was glorious and, though I had started late, in the ardor of setting forth I decided to push on across the mountains to Mothruvellir, 25 miles distant, that night if possible.

Light clouds were resting like giant snowflakes on the cheeks of the great hills far before me, where the glaciers sprawled in fantastic shapes, and beside me an Icelandic curlew dipped and rose, uttering the wild cry which gives it its name in this country, "Spoo-ee! Spoo-ee!" It came very near, as the birds and beasts do in Iceland, where they have not yet learned overmuch the fear of man, and reminded me of a legend popular here.

One Sabbath day, according to the story, Christ had molded some birds from the common clay. An angry neighbor who was passing by kicked them down, offended at this desecration of the Sabbath.

With one wave of His arm the Molder restored the figures to their places, and when He clapped His hands they rose and

© Isobel Wylie Hutchison

THE "SMIDUR" (BLACKSMITH) GEYSER BAITED WITH SOAP AND IN ACTION

© Isobel Wylie Hutchison

NOT WATER BUT SILICATES AT THE GREAT GEYSIR

"Geysir" is a proper noun after which all similar phenomena throughout the world have been named. The usual spelling of the word is "geyser." There are several geysers in Iceland, but only one "Geysir." Great Geysir was very active for a short time following the earthquake of 1896. As the years went by, however, it gradually subsided. In 1905 it spouted only twice a day; later, so far had its strength dwindled that it would perform only after some 30 or 40 pounds of soap had been thrown into it. Now it is dead—a deep, round pool of crystal-clear hot water, which simmers inside the low, symmetrical cone of siliceous rock formed in the days of its glory.

OFF FOR A SHORT JOURNEY

Every man, woman, and child of Iceland can ride. A man having a considerable distance to go generally uses three horses—one for his baggage and two for himself. He changes mounts every hour.

Photographs by John A. Manley

NEARLY A FOURTH OF THE INHABITANTS OF ICELAND RESIDE IN THE CAPITAL CITY OF REYKJAVIK

Many of the houses of the Iceland metropolis are built of timber covered with sheet iron and gaudily painted, but the government buildings are chiefly of stone. The city's principal monument is a statue of the famous sculptor Thorvaldsen, whose father was an Icelander.

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IN THE MODE OF PARIS AT REYKJAVIK

Many women, especially in the capital, have adopted European dress, which they say is more comfortable, if less picturesque, than their national dress.

Photograph by Hans Petersen

AN ICELANDIC LADY IN NATIONAL COSTUME

The festival dress, usually of blue or black velvet or cloth, is embroidered with gold filigree, and the hair is drawn back into a lawn headdress fastened around the forehead with a gold diadem.

© Isobel Wylie Hutchison

WASHING AT THE HOT SPRINGS NEAR REYKJAVIK

Some of Iceland's wealthier and more progressive farmers are now piping the water from such hot springs into their homes for heating and cooking purposes (see page 481).

flew with flashing wings and merry cries. These Iceland birds are said to repeat the cries of the birds of clay in Nazareth.

THE WOMEN OF ICELAND ADHERE TO PICTURESQUE NATIONAL COSTUME

The birds and flowers were to be almost my sole companions throughout my journey, for not on the most barren moorland did I lose touch with the beautiful little Alpine flora, the cushion pink, the white mountain saxifrage, the sea pink, which we associate with the rocks of the shore, but which grows all over the arid beds of what were doubtless once molten oceans of lava.

In spite of my heavy knapsack and waterproof, I was so happy to be on the road at last that my spirits sang with the curlew, and very happily, about 4 in the afternoon, I reached the wooden church and farm parsonage of Lagafell, amid its green pastures, where the haymakers were busy. By the aid of a phrase book picked up in Reykjavik, "The Englishman on Iceland," I made bold to ask for coffee, after which the *husfrue* (the lady of the house) not only showed me over the little red-roofed kirk, with its picture of Christ above the altar (the Icelanders are Lutherans), but also took from a drawer and shook from its folds, for my edification, her best gown of fine black cashmere, embroidered round the foot with leaves and flowers of yellow silk, and an old silver belt and clasp graved with an image of the Madonna (see pages 477 and 479).

Most women of Iceland still wear this very picturesque national costume, handed down from mother to daughter, with headdress of a small, flat black cap and tassel with silver ornament. Their hair, which is usually abundant and beautiful, hangs down the back in plaits or is looped up again and caught under the cap.

It was 5 o'clock when I left Lagafell, and soon I struck off from the postroad, leaving the last motorcar I was to see till I reached Blonduos, in the far north, and made for the mountains across a tableland of stones.

An unkempt Icelander, on a mean farm

at the foot of the Svinaskard, showed me the track and ford across a considerable stream and indicated by his watch that it would be midnight before I reached my destination. A little dismayed, for I was now very tired, I pushed on for the pass.

Up and up the twisting track led. When I turned I saw Reykjavik, lying far away behind me in the sunset, the harbor still catching the light.

To my dismay, a thin white mist now began to close about me, getting thicker and thicker as I rose. This was my worst enemy, for in the gathering twilight (it was after 10 o'clock, but still light) the path was hard to find, and I began to contemplate a night on the wet hillside—no inviting prospect.

Near this place, in a snowstorm last winter, a man was found frozen to death with his two young children in his arms. Did he call to mind, perhaps, as the darkness and the snow closed over him, the beautiful words of the 16th century hymn-writer of Iceland, Hallgrimr Petursson:

"Whene'er the Master calleth
No man may buy him free,
And night, where'er it falleth,
Hath naught of fear for me."

© Isobel Wylie Hutchison

SHE DRESSES AS HER GREAT-GREAT-GRANDMOTHER DID

A dark jacket and skirt, a silver belt, a shawl for out of doors, and a small cap with a long, thick tassel distinguish the Iceland woman who clings to old styles (see, also, illustration, page 485).

### THREE HORSEMEN SHOW THE WAY

I was still mounting, and the head of the pass seemed farther and farther off. Suddenly through the mist three riders loomed upon me, going in the opposite direction, staring with amazement at my flushed countenance.

I stopped them abruptly.

*"Talith ther ensku?"* ("Do you speak English?")

To my joy came the answer from a young man at the rear, "Yes, a leetle." Mothruvellir was still 6 miles distant. "But you do not see it from the road; it is on this side of the river; take care you do not miss it."

Without this providential word of guidance, I doubt if I should have reached the lonely mountain farm that night, for the track was scarcely distinguishable from the moor by the time I came to the river at the foot of the pass.

I blundered dazedly on to the left over

Photograph by Thorleifur Thorleifsson

A WINTER STREET SCENE IN REYKJAVIK

The seat of government of the island is also the seat of the national university, which was established seventeen years ago with four faculties—theology, medicine, law, and philosophy. While Iceland is on the fringe of the Arctic Circle, its climate is much milder than regions in the same latitude on the eastern seaboard of America. The mean temperature at Reykjavik in January, the coldest month of the year, is two degrees below freezing and in July about 52° Fahrenheit.

the bog, and suddenly something rose before me on the skyline like the outline of a dwelling. I had nearly reached it when there came the sound of a pony's hoofs behind me and a man's voice singing.

As I neared the door of a poor-looking wooden shed (for so the farm seemed to me in the darkness) the rider cantered up, and it is a wonder that he did not think me a troll and turn me from his dwelling, for I must have astonished him considerably by my sudden appearance there at midnight.

I hailed him desperately. *"Get jeg fengith her gistingu?"* ("Can I stay here the night?") He stopped singing, leaned from his pony, and peered at me; then, holding out his hand, tried to take mine.

Sudden consternation seized me with the thought that he was drunk. No sign of life came from the farmhouse. On all the wide mountain he and I and the pony seemed to be the only living creatures.

Loneliness and a night on the stones were better than such company, and I retreated hurriedly into the mist again while he dismounted.

I heard him blunder into the house, but no sound came from it. I was about to return again into the night to find some place where I could lie down, for I was now so weary that I think I should have slept where I fell, when I remembered my friend's kind wish, "God save you!"

"JO! JO! SHE IS HUMAN!"

Shame seized me. Where was my boasted faith that it should disappear at the first fence, so to speak. Summoning my courage in both hands, I returned to the house, and as I neared it I heard to my joy the sound of a woman's voice. Though I did not understand a word, I know as well as if I did that they both cried, *"Jo! Jo!* (Yes!). She is indeed a human being!" as I came up.

The man vanished, and to this day I

Photograph by John A. Manley

THE REYKJAVIK PUBLIC LAUNDRY

This building is situated opposite a natural hot spring which continues to flow nearly boiling water the year round without change in temperature. The clothing is brought here and washed and accommodations for drying are furnished by the city.

Photograph courtesy Roger Nielsen

ICELAND'S HOT SPRINGS ARE A BOON TO THE NATION

Nature provides the boiling pot for these housewives and helps to solve the fuel-for-heat problem (see, also, page 478).

Photograph from Roger Nielsen

GULLFOSS, ICELAND'S MOST FAMOUS CATARACT

Golden Fall is so named because of its color in the sunshine. It is a drop in the river Hvita (pronounced Kveetow), a few miles from Geysir (see page 475). The water descends in several steps, and although the fall has a total height of only 150 feet, it compares favorably with the most beautiful in Europe and has even been likened to Niagara. Tourists proclaim Gullfoss one of the "lions" of the country, and so put it in a class with Hekla, Geysir, and Thingvellir (see pages 469, 473, 474, and 475).

do not know if he were drunk or not. I only know that presently I found myself seated in the window of a wooden-walled room drinking a glass of milk—I was too tired to eat—while a kindly woman's face peered dimly at me in the darkness that was now lit by a great golden moon rising over the shoulder of the hill, pouring its light through the dark valley which had before seemed so dreadful.

"Got lampa here!" I said, pointing, while she sought clean linen from a little wooden chest and buttoned the eider-down duvet into it. Every Icelandic bed has its eider-down duvet for sole covering, and warm enough it is in all conscience on a fine summer night!

"Yes, yes, good lamp!" she said, and when she had persuaded herself that I had indeed come over the pass without a pony, *gangende* (a word which all Scots will recognize as meaning "walking"), she left me at last, and I fell into the clean bed and slept till the sun had long ousted the moon from the skies. Indeed, I do not remember to have seen the moon again during my tour.

III

Beside the little farm of Mothruvellir there flows a fair-sized river, and beyond it barren lava peaks soar aloft, dividing the valley from Hvalfjördur (Whale Fjord). On its far shore, a good 25 or more miles distant, lies the little church and parsonage of Saurbaer (baer, pronounced like the Scottish word "byre," means a farm), my second destination, and, as I found, the last resting place of Hallgrimr Petursson (see text, page 479), whose gravestone lies just outside the church door, amid the nameless green mounds of the little kirkyard, where he can hear of a Sunday his own sweet melodies, still among Iceland's favorite hymns.

Petursson died a leper, a disease now happily nearly extinct in Iceland. I visited

Photograph by Thorleifur Thorleifsson

AMID ICELAND'S GLACIERS

The glacier and the volcano exist side by side in Iceland; often they are combined, for many of the mountains, from whose tops the glaciers are slowly pushing downward, are slumbering volcanoes which melt the bottom layers of snow and send down those many hundreds of icy streams which the traveler continually encounters. The glaciers themselves surpass in size all similar phenomena in continental Europe. They have a combined area of some 5,300 square miles, or more than three times the area of the glaciers of the Alps.

the leper hospital in Reykjavik and was told by the doctor there that there were only 58 cases left.

I limped into Saurbaer late in the evening, for I had missed my road on a high mountain and had gone an hour out of my way down the valley toward Thingvellir before I discovered my mistake. But the magnificence of the scenery, when I at last struck the path on the other side of the mountain, after a scramble up its face, and the beauty of Hvalfjördur, lying below me in the radiant sunshine, compensated for my weariness.

I met only one party of riders in the whole day, till I reached the historic farm of Thyril (Cream Whisk, from the shape of the hills), 9 miles from Saurbaer, lying in green pastures under wild volcanic crags like a mass of petrified sponges.

### A HAUNT OF OUTLAWS AND EIDER DUCKS

A bottle-necked peninsula juts out into the fjord here, and not far away is the precipitous islet of Geirsholmi, a haunt of the eider duck and famous in Icelandic sagas, for here lived Hord, the outlaw, with Helga, his wife.

Hord had fallen under the ban of outlawry on his return from Sweden, where he had broken into a grave and found its dead inmate seated solitary, in his ship, amid his treasure, but still unwilling to part with his gold. Hord wrested a gold ring from him, which brought a curse with it, and he was outlawed. To this lonely islet of Hvalfjördur he fled, and lived by harrying the neighborhood, but at last he and his men were massacred by one Thorstein of Thyril.

Helga, with her two young sons, escaped by swimming ashore. She made her way through a rift in the columnar crags high above Thyril to the house of her sister, Thorbjorg, who was so much moved by the story that she could not speak.

That night Thorbjorg stood over her

Photograph by Hans Petersen

ICELAND PONIES LOADED FOR A JOURNEY

It is fascinating to travel on pony-back from farm to farm, enjoying the hospitality of the people at night; but when it is remembered that the greater part of the country's transportation of both "passengers and freight" is effected in this primitive way, the method is apt to lose some of its glamour.

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A PONY IN AN ICELANDIC "FOREST"

The absence of trees in Iceland gives a bleak aspect to the land. A birch 15 feet high is a forest giant (see text, page 485).

Photograph by John A. Manley

ONE GIRL OF THIS PICNIC GROUP WEARS THE NATIVE ICELANDIC COSTUME

husband, Gullknapp, and with his sword gave him a sore wound, so that he cried out. "Fetch me," she said, "the head of Thorstein of Thyril." This, after much slaughter, he eventually did, and, as the story concludes, "Everybody thought that Thorbjorg had done a very fine thing."

In the bright summer afternoon, with no trace left of these savage deeds of a thousand years ago, I reached Thyril, drank three cups of coffee, and was guided on my way toward Saurbaer by a golden-haired child called Solveig.

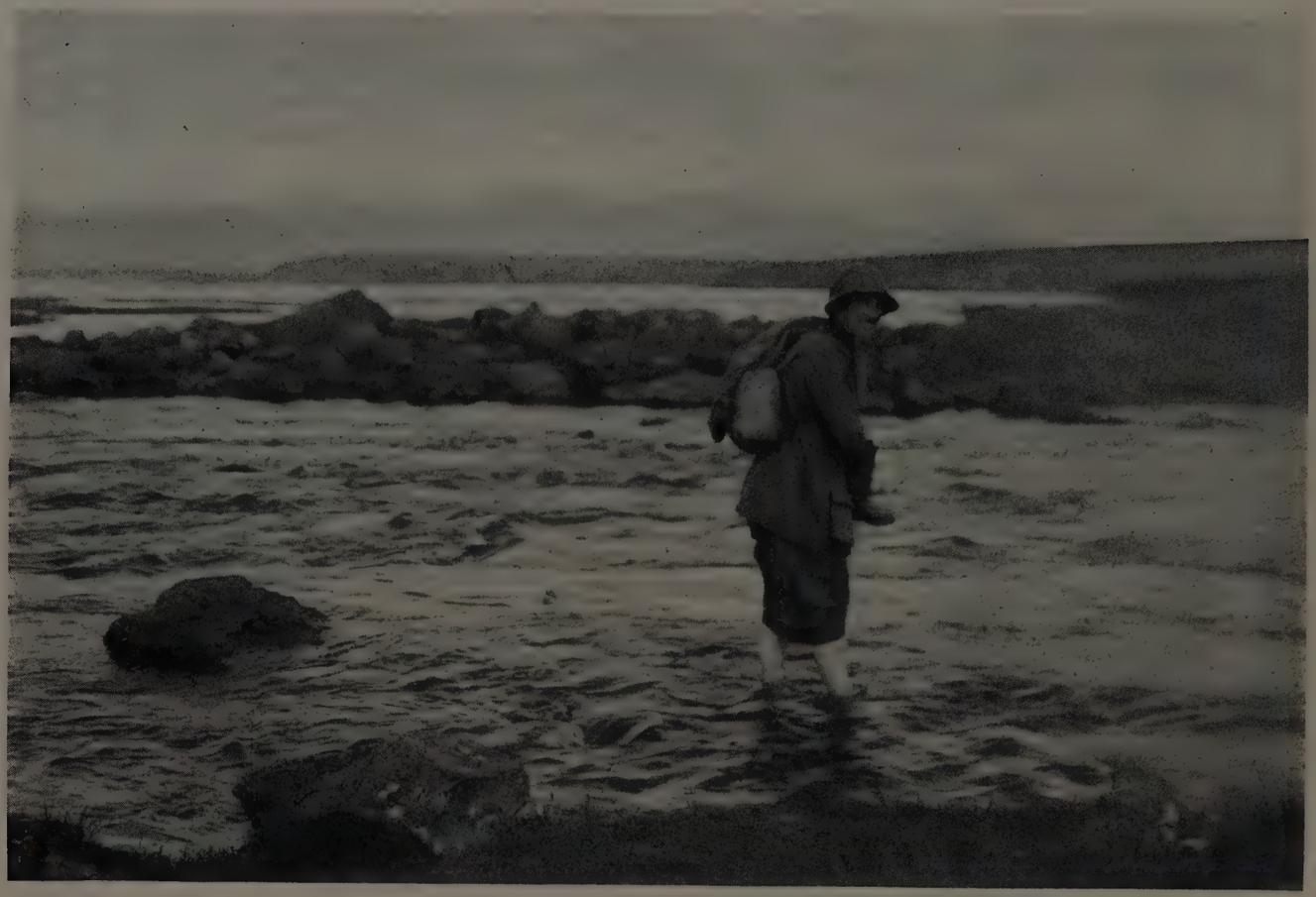
At Saurbaer I was received with immediate hospitality by the wife of Dean Thurlacius. What a haven of rest was the little parlor, with its velvet sofa and bright nosegays of wild flowers, on whose threshold I at last removed my dusty Scottish boots! Her son spoke English excellently and next morning came in to take breakfast with me.

"You must have a pony for your journey to-day," he said. "There are two deep rivers to ford." He insisted that he must go with me to Hestur, 20 miles distant, and introduce me to another minister who spoke English, Sera (the Rev.) Eirikur Albertsson, who would guide me to Nordtunga the following day over two other difficult streams (see page 493).

### SWANS SING AMONG THE LONELY HILLS

So, on ponies we set off, my guide Magnus making a detour in order that he might show me an Icelandic "wood" where a Y. M. C. A. party from Reykjavik had recently encamped. "A beautiful place," as, indeed, I found it, though the tallest trees, all birch, smelling sweetly in the rain that had fallen that morning, were scarcely more than 15 feet high.

"I think Iceland is very, very beautiful," said Magnus solemnly, as he halted his



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ON THE "ROAD" TO AKUREYRI: THE AUTHOR FORDING A RIVER ON FOOT

Photograph by Hans Petersen

ICELAND FARMERS

The lack of fuel is one of the Icelandic farmer's greatest cares. With imported coal in the cities costing exorbitant sums and impossible to transport to the interior, and with native peat difficult to carry in pony-pack caravans, the only material the farmer can burn is sheep manure. Luckily, the houses are tightly constructed and often the heat from the kitchen stove is enough to warm the living-room.

Photograph from Isobel Wylie Hutchison

FORDING AN ICELAND RIVER BY PONY

Except in the desert of the uninhabited interior, water is only too plentiful in Iceland. Small, icy mountain streams and turbulent rivers are encountered on every hand.

pony to point to a glorious view of the sun striking fire from Borgarfjördur, beneath snow-splashed crags not whiter than the wild swans we had just passed, swimming on a little mountain loch. "You call it a tarn, I think," said this young Icelandic linguist.

He told me that there were many swans, and that it was lovely to hear them singing in the evening, amid the lonely hills. I was pondering on this strange music, for I had never heard of swans singing except before they died, when suddenly my pony took to his heels in a mad canter, which left me clinging ignominiously to his yellow mane, laughing and shouting breathlessly, *"Nay! Nay!"* (which is the pretty Icelandic for No!).

And so, presently, we reached Hestur, a little parsonage and farm with a glorious view over a wide plain and twisting silver salmon rivers to Borgarfjördur.

THE "BIL" IS REPLACING THE PONY EVEN IN ICELAND

Here I made the acquaintance of two new things—salmon soup and an Icelandic sidesaddle—neither of which I enjoyed. The sidesaddle had to be exchanged for a man's saddle at the nearest farmhouse, and how Icelandic ladies can sit—far less canter—upon this unwieldy upholstered contrivance, with its iron handrail, is to me a matter of awe and amazement.

Sera Albertsson was as kind and hospitable as his neighbor of Saurbaer—a man of wide culture, with English and other foreign books in his library. He was away fetching hay with his ponies when I arrived and I did not see him till the next morning. He came with me over two rivers, across the stony tableland, and past the steaming hillsides of Reykholt, till we had crossed a milky glacial torrent over a bridge whose hollow-sounding boards his pony, perhaps with prescience, resented. "In twenty-five years," said Sera Albertsson regretfully, "the pony will be a luxury in Iceland. It will be all 'bils' (automobiles) and bridges and roads."

The road here was excellent and in the dust I could already see the track of a motor tire.

Before leaving me he took me up to the top of a height to point out to me the

Photograph by John A. Manley

ICELANDIC HAY WAGONS

On the quantity of hay harvested depends the number of sheep and ponies which the farmer can keep during the winter.

farm and kirk of Nordtunga, lying in the valley below, beside another bridge and salmon river.

"I have been told that the geography of Iceland is more like that of the moon than any other part of the earth," I said, as I surveyed the fallen plain and the gaunt, extinct craters.

"I can well believe it," he agreed gravely.

"I hope we shall meet again some day, perhaps on the moon," I said smiling, and so we shook hands and parted, and I watched him regretfully till his ponies had turned the corner.

He had spent a valuable summer day, which might have been devoted to hay-making and numerous other occupations, in conducting a stranger, at a moment's notice, 15 miles across country. When the "bils" come, and the bridges, and so-called civilization, will Iceland show such hospitality to the stranger within her gates?

## IV

With the horrors of Nordtunga I cannot deal here at length. It was nothing short of a hotel, crowded to literal overflowing into two annexes in the fields with kindly Icelanders, who had been warned of my arrival by telephone from Hestur (the telephone has outrun the road in this part of Iceland) and had a Union Jack ready to hoist in my honor as I walked up! (I am a shy person, with a morbid horror of publicity!)

At supper two rooms had been thrown into one, and an enormous table spanned it, crowded with visitors. A lady, speaking excellent English, constituted herself my interpreter and guardian and beckoned me to a chair by her side. All eyes were turned upon me, and as the meal proceeded I blushed at every mouthful.

My journey was the sole topic of conversation. By what stages had I come? Where would I stop? How would I cross the rivers that still lay between me and Akureyri? No Icelander would dream of undertaking such a journey on foot without a pony or guide; it was an admirable thing! Walking tours in Iceland are unknown. It is all pony here!

This adulation revived my drooping spirits. To these kindly, simple folk I was something of a heroine! What be-

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THE "TRAIL OF THE SERPENT," AN ICELANDIC MOTOR-BUS

Forty years ago there were no roads for wheeled vehicles whatsoever in Iceland; to-day there are only 400 miles over which automobiles may travel with comfort, and few of the towns and cities are connected with highways. According to a program of construction recently outlined, in 1934 motor-buses will be able to travel from Reykjavik to Akureyri.

Photograph by John A. Manley

A GUIDEPOST OVER BARREN LAVA FIELDS

In summer the road may be followed without difficulty, but in winter the trail is obliterated, and, as there are no trees or other landmarks whereby it may be followed, travel becomes dangerous; so these pillars of stone are built as signposts. On the side near the automobile is a projecting stone, which indicates that the road is on that side of the monument.

THE BURDENS OF ICELAND ARE BORNE ALMOST EXCLUSIVELY ON THE BACKS OF PONIES

Small, shaggy, sure-footed, and extraordinarily strong, these ponies are in demand in many countries. Their importance in island transport is due primarily to the absence of good roads for wheeled vehicles.

tween the salmon and the admiration, I swelled visibly and blushed more and more. But a stout, pasty-faced Icelander at the head of the table, who I am convinced had never walked farther than a mile for several years past, had too much of this and cut short my pride.

"When we Icelanders come to the rivers, we swim them!" he cried bombastically, "and carry our clothes on our heads. We are not Icelanders for nothing!" At which there was a general burst of merriment and my exploit sank to its normal proportions.

The place was crowded, but a bed would be arranged for me, I was told, in the sitting-room, one of the double rooms in which supper had been served. It had five keyless doors, through which the traffic of the house surged, and my chances of a quiet night seemed desperate.

I was very weary, but I could not even take my boots off. In this extremity my English-speaking friend came to my rescue and offered me a bed in the annex.

"There is another lady, but you will not mind her," she said as she opened the little wooden door and showed me two clean pallets on either side. As an alternative to having the entire household as my roommates, this seemed comparative privacy, and (though there is nothing in the world I dislike so much as having to share a sleeping apartment) I accepted it with thankfulness.

The next night I spent in the poor cabin of Fornihvammur, far in the hills, having taken a pony and guide from Nordtunga across a fair-sized river and gone on afoot thereafter. All I saw of the sun that day was an occasional faint shadow on the path, accompanying me through the mist.

A wild mountain river foamed at my right hand. I met not a soul, and presently the rain descended, and I arrived soaked to the skin. It was a poor place, but the kindly people did their best for me. Gudmunder, the husfrue, dried my garments at the kitchen stove and ran to pat me on the cheek and back, in her pity at my unintelligible Icelandic, every time I opened my mouth.

### A PONY JOURNEY OF MANY TRIBULATIONS

With much difficulty I bargained for a pony and guide next day over the long, barren heath of Holteordurheithi. There were no large rivers to cross, but the distance to my next halt, Stadur, was considerable. Rain was still descending in torrents, and Sera Albertsson had counseled me to take a guide here.

Never shall I forget my ride over that heath! I could certainly have walked it more quickly, despite the rain. I had asked for a "quiet horse," and doubtless the agent had his tongue in his cheek when he assured me that my thin little brown nag was a "stiltan hest," for never have I had a worse mount. Don Quixote was not in it with me and Säkki (my Sancho Panza, a young boy guide) that day.

Throughout the dismal, dripping stroll of eight hours over the dreary moorland, beside foaming mountain rivers, only once, in the late afternoon, did one of the ponies break into a faint amble, though I do not yet know if they were both very old, very ill, or only very lazy. I suspected mine also of being a little blind, as it stumbled whenever I tried to urge it on.

In this miserable way, the most tiresome of all forms of pony riding, we proceeded for miles in gusts of wild rain, with shadowy intervals in which the sun tried, but failed, to pierce the mists. Up a long valley and over a bleak tableland we went, to the northern seaboard at Hrutàfjördur, where, in sight of the northern sea, I felt that my journey was half accomplished.

### ICELANDIC HOSPITALITY

I tried to console myself for my slow progress by reflecting that I had come to Iceland with the hope of escaping speed, motorcars, and senseless hurry. I counted the small wild flowers by the path: thrift, polygonum, bedstraw, and the golden saxifrage, which they call beautifully in Iceland *soli* (Sun's eye).

But, soaked as I was, it was with a sense of great weariness and relief that I fell off my pony at Stadur in answer to a hearty roar from Farmer Gisli Ericsson, with his huge laugh, his quick intelligence, and highly successful efforts to converse with me in Icelandic. All the names of the days he wrote down for me in my diary. He was the first man I had met who took snuff (from a mull made of a walrus tooth mounted in silver).

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BRINGING HOME THE HAY

With the exception of sheep- and horse-raising, practically the only agricultural pursuit of Iceland is haymaking. Every farmer has a small field called the *tun,* which he fertilizes and tries to keep level. Most of the hay grows wild, however, and is a sort of marsh grass found on the boggy moors.

Not a penny would he accept next day for the meals I had eaten or the clean, comfortable upstairs bedroom in which I slept for twelve hours without turning.

"I would willingly leave you some crowns," I urged timidly as I was departing. His blue eyes flashed. "Nay!" he roared in his tremendous voice, and again, "Nay!" It was enough that I had taken a photograph of his wife and mother, his pony and his dog, and would send him these. He would have none of my crowns, but I feel sure he has a golden one awaiting him some day in that Heaven which enjoins us "to use hospitality ungrudgingly."

ROSY-CHEEKED AMAZONS ENJOY A COFFEE PARTY

It was Sunday morning when I left him to walk to Stadur-Bakki, 15 miles distant, up the side of Hrutàfjördur and across the moor. The day seemed full of sunshine and peace, and I went down and sat by the water to rest ere turning inland over the hill. It was very lonely and very peaceful, with no sound on the shore save the melodious chord of the sea, the clouds resting gently on the mountains, casting blue shadows. From a green farm across the water came the faint barking of a dog, and once an oyster catcher flew over me, calling shrilly.

I reached the farm of Stadur-Bakki to plunge into the midst of a Sunday coffee party. Rosy-cheeked Amazons in riding skirts and rough-haired young farmers were seated round the table to which I was led by my next hostess, and all eyes were turned upon the *Frue Ensku* (Englishwoman) in amazed curiosity, as I gulped my coffee and made desperate efforts to converse about my journey. "What! Walking? Never!" And a roar of laughter and queries as to what sort of boots I wore.

My new host was a snuffy, spectacled man of a different kidney from Gisli Ericsson. I had picked up enough Icelandic to understand that he discussed with his companions under my very nose the price he might ask for the horse and

SERA ALBERTSSON OF HESTUR, AN ICELAND MINISTER, AND HIS PONY

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THE AUTHOR FORDS A RIVER WITH A GUIDE AND PONY

Bridges, like highways, are rarely to be found in Iceland, and in crossing the swifter and deeper streams along her route, the author was forced to rely upon ponies.

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THE CHURCH AT HOLTASTADIR

It has a fine old door handle and a quaint pulpit (see text, page 495). Here the author met the most charming hostess of her Iceland walking tour.

guide I required next day over the Vididalsà, one of the deepest rivers I had to ford on my journey; but his jaw dropped when I tackled him, as he was returning in the gloaming after seeing his friends off, and across the dark supper table asked him point-blank to state his price. He eventually agreed to reasonable terms (the equivalent of $2.50) for a guide and ponies across two rivers to the farm of Laekjamot, from which I was to walk on 12 miles across another lesser stream, the Glerà, to the farm of Knauser.

The Glerà, though small, was the deepest river I forded on foot, coming well to the knee, and the fates willed it, as if in frolic, that I should cross it not once, but three times; for just across, struck by the beauty of a waterfall above the ford, I stopped to take a picture, and lo and behold, my camera was gone! I had left it half a mile back on the other side, where I had paused to rest. There was nothing to do but to plunge in again and return for it.

I came down to Knauser on a brilliant evening and struck a motoring track again, leading to the little seaport of Blonduos, where I spent the next night at a guest-house with a good soul, I think a member of the Salvation Army, which has many members in Iceland.

In all the interesting journey I saw no stranger scenery than the clustered knolls of Knauser, like giant molehills. Their strangeness reminded me forcibly of photographs I had seen of the craters of the moon, but of anything like them on earth I knew nothing, save perhaps the shale bings of the Scottish Lothians.

## "AN ANGEL ON HORSEBACK"

From Blonduos, a pleasant little village at the mouth of the dangerous glacial Blandà (White or Blond River), I passed on up the valley to Holtastadir on a lovely hot day. On the way, as I was toiling head down against a strong wind, a kindly Amazon came klop-klop behind me, pointing to my knapsack, pointed to her pack pony, and, hardly waiting to hear me cry my destination, whisked my burden from me and was off with it. Talk of angels

on horseback! For a few short miles I was a free woman and knew what Christian felt like when he cast his burden down!

The Icelander is honest as the day, and there was my pack awaiting me when at last I reached the delightful farm of Holtastadir, with its garden plot, a most unusual thing in Iceland, of monkshood, shirley poppies, and roses amid the family graves.

The gracious hostess was also organist of the little church close by (see illustration, page 494), with its quaint old pulpit, showing Moses and Aaron, with a panel of the Crucifixion between, and Mary standing at the foot of the Cross, looking for all the world as if she were laughing instead of weeping!

The lady of Holtastadir, with her quiet dignity, her love of flowers and music, was the most charming of all my hostesses. She played to me many lovely hymns and songs on the church organ, weeping surreptitiously over the last one, a beautiful Icelandic burial hymn, perhaps Hallgrimr Petursson's. Her small son, Josaphat, who accompanied me on horseback for several miles next day and told me all the names of the wild flowers, of which he had already collected 130, was also the most delightful of guides.

I pushed on after he left me to Vidimyri, 20 miles, over high, magnificent mountains, mistaking my way again, but recalled to it by a kind woman at whose farm I stopped for coffee. Seeing me going astray down the valley, she came running after me half a mile to set me on the right path. For this inestimable service I could only wring her hand and say, *Bestu thakkir* (Best thanks).

### CHURCH IS FAMILY LAUNDRY ROOM ON WEEK DAYS

At Vidimyri I found an old kirk roofed with grass and filled, as it was a week day, with the family washing, suspended, drying, amid the tall wooden pews! It had also a very fine old silver and jeweled communion cup engraved inside with the head of a knight in armor.

A silent, dignified man in a tail coat and spectacles, more like a lawyer than a farmer, accompanied me next day on pony-back to the boat ferry over the broad Herodsvotn, the deepest and widest river between Reykjavik and Akureyri.

We waited an hour on an island in the middle, to which we had crossed on pony-back, shouting in vain for the ferry. At last another Icelander, newly come from Canada and talking English with a fine colonial accent, joined us on our islet with his pony and helped us to halloo till the ferryman appeared from the other side.

This new traveler counseled me to call on the minister at Miklibaer (Muckle Byre, or Big Farm), which good advice ended in my making the best friends of all my journey and spending the night there with the young parson, Sera Laurens, and his gentle wife, Gudrun. They were raking the hay when I arrived, but Gudrun came in to wait upon me, standing beside the table, as is the embarrassing custom with Icelandic ladies, and only with difficulty being persuaded to eat with her husband and me.

### A TRAGIC TALE IN A CHURCHYARD

She was very modest and pretty, with long, dark plaits. Her husband, who talked English well and had a whole shelf of Rabindranath Tagore and Sir Oliver Lodge in his bookcase, took me to see the church, where there is a fine old 17th century altarpiece by one Oddur Gislason, a man with a strange history. One day, coming from his farm to the church, only a few minutes' walk distant, he suddenly disappeared and has never been heard of since, though it is said that his maidservant, who had cut her throat for hopeless love of him and whose dying request to be buried in consecrated ground he had sternly refused, had spirited him away.

In the churchyard here, amid the nameless mounds, Sera Laurens showed me a white marble stone from my own country of Scotland, erected by his fiancée in memory of Mr. W. W. Howell, who was drowned near here 25 years ago, while crossing the Herodsvotn.

The broad, green plain of the Herodsvotn, shining in the evening sun, with the haymakers at work far over the emerald swards, was one of the loveliest parts of Iceland that I saw, and while I helped Gudrun to rake the hay, Sera Laurens

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THE HERODSVOTN RIVER, NEAR MIKLIBAER AND JOURNEY'S END (SEE PAGE 495), MUST BE CROSSED BY FERRY

showed me how to rake it first into *funks*, or armfuls, and then into the long haycock called a *bolster*.

It was after 9 o'clock before the last sunlight faded behind the mountains and the soft fingers of the mist began to girdle the great peaks. Then, the hay being too wet now because of the dew, we went in to the house for supper, and while Gudrun prepared it Sera Laurens showed me his books and read to me in Icelandic, from his shark-skin and silver Bible, of the tongues of men and angels, that I might compare his tongue with its descendant, English.

He also repeated to me in excellent English the complete poem, "It's a long way to Tipperary," but I told him that I thought the way to Akureyri was longer!

Next day he accompanied me up the valley as far as Silfrastadir. "I am determined to accompany you," he said quietly, when I protested that I must walk.

His charity was real. Like Gisli Ericsson, not a penny would he accept for his hospitality. "I think this must be yours," he said, picking up the bank note I had left awkwardly on the table. "Will you not take it for your church?" I protested. But the Icelandic service has one advance on ours—there is no collection!

"You cannot give back change from the church," I smiled. He hesitated. "Well," he said, "there is a poor widow living here with two children; may I give it to her? Gudrun!" He called his wife, and presently, as the ponies were being saddled, a young golden-haired woman came up to me with scarlet face to shake me vehemently by the hand and thank me for Sera Laurens's charity.

### A DINNER DISH RESEMBLING GUMMED WOOD

Two more nights and my walk would be but a golden memory. The next night I spent at a very poor but clean mountain cabin, with a young Icelander, his wife and child. Petur, my last host and guide, was a splendid fellow—dark, sunburnt, tall. He might have come straight out of one of the Sagas.

They were simple folks, who pored for long over Sera Laurens's letter of introduction, which I had presented. They had but little to offer me for supper. Eggs? Nay. Porridge? Yes, yes! Then Petur, in triumph, pointed to the words

in my book, *hardfiskur* (dried fish). "Jo, jo," I pretended. "Hardfisk is good!" May I be forgiven the lie! I found it like strips of gummed wood. Fortunately, the cat had come in to accompany my supper!

Up the wild, narrow valley Petur and his ponies accompanied me next day, a hot Sunday of glorious sunshine, till I had safely crossed my last ferry, the Oxnadalà.

My first pony had been called "Leuki," the name, I believe, of a heathen god; it was fitting, then, that my last pony, which brought me within a day's reach of my Promised Land, should have borne a name which I could only interpret as Moses.

With sorrow I slipped from his saddle, shook hands with Petur, and watched him till he had recrossed the river and was far within the shadow of the great mountains, where his simple, happy life is lived. If these people are poor, they do not know it; but as I turned down the green hillside to my last halt at the parsonage of Baegisa, I thought only of how rich they were.

### JOURNEY'S END

Baegisa is a fragrant memory of soaring mountains, a beautiful maiden, and clean sheets with "süsse träume" stamped on the quilt; and last, but not least, of the most wonderful dish I tasted on my journey. It was brought to me after breakfast by the shy, blue-eyed young daughter of the house, with her massive plaits of fair hair hanging nearly to her knees.

The cream and spoon I had seen on the table, and awaited with philosophy their usual Icelandic accompaniment, *skyr,* a kind of curdled sheep's milk supped with cream and sugar. Imagine my astonished delight, then, when in this fruitless country was placed before me a great dish of mountain blueberries with the dusky bloom yet upon them! She piled them and poured cream and sugar lavishly.

Says Hazlitt, "There is one subject on which it is pleasant to talk upon a journey, and that is what one shall have for supper when we get to our inn at night." And if it seems gluttonous to you that on our last morning together I boast of my breakfast, I can only apologize and bid you farewell, for now we are come within sight of Akureyri and our journey of 260 miles across Iceland is accomplished.

Opposite Baegisa there is a mass of lofty mountain peaks soaring into the sky like the spires of Milan Cathedral, with one great needle called the Finger. As I came out from the parsonage wiping my lips regretfully, for I had not dared to finish the whole bowl of bloombeeren and wished I had, there rested on the hillside beneath the snow a great splash of rainbow. It was the mountains' farewell.

Before me the road stretched down the valley to the sea, broadening till I saw again in the dust the serpent's trail, the impress of a motor tiré.

I turned for one last, long look at the rainbow, the glaciers, and the soaring Finger; then, hoisting my knapsack, I set my face to the sea.

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Photograph by John A. Manley

ICELAND'S FUTURE PROSPERITY MAY BE WRITTEN IN WATER

The development of the nation's tremendous reservoir of water power into hydroelectric energy would pave the way for innumerable manufactures.

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SHE LOOKS FORWARD TO THE DAY WHEN HER COUNTRY WILL NEED FEWER BARRELS

Her fisheries will always be an important item in the island kingdom's list of exports, but Iceland fishermen hope that the time is not distant when much of their catch can be sent fresh by refrigerator steamers to England and other consumer countries, whereas now the harvests of the sea must all be sold as dried or salt fish.

# THE ISLAND OF THE SAGAS

By Earl Hanson

ICELAND'S name naturally suggests to the prospective visitor that he will find a frozen waste. And when his map shows this island to lie across the very threshold of the Arctic Ocean, hard by the glacial coast of Greenland, and 300 miles farther north than bleak Labrador, he is almost prepared to come upon a land of polar bears and of fur-clad folk living in snow igloos.

Iceland is libeled both by nomenclature and maps. On many charts the most important physical fact in its life does not appear. Up from the south flows the warm Gulf Stream to enfold the island and work the magic of whisking it, in effect, nearly a thousand miles toward the Equator; so that its climate is not that of the polar regions, but of southern Canada or northern United States (see map, page 470).

On Iceland's coasts are thriving towns with buildings of stone, gabled roofs and church steeples, busy streets and electric lights. In the streets are men and women garbed much as are the inhabitants of Copenhagen and Glasgow, Ottawa and Minneapolis. One's eyes tell him that here is the same civilization that Europe and America know.

And immaterial factors proclaim the truth still more unmistakably than do material things. Here, in this far northern land, a worthy national literature and stable national institutions were developed when much of Europe was floundering in the Dark Ages. Here the lamp of a Nordic Renaissance burned and lighted its own region before the beacon of the Latin Renaissance was held aloft to light the way for the world. This northern light has never failed. To-day the literacy rate is higher in Iceland than in many countries of Europe.

### FIRE AND ICE HAVE CONTENDED FOR MASTERY IN THE INTERIOR

It is true that physically Iceland's best foot is forward. Its most pleasant aspect is its fringe of coast. Inland it is in nowise a pretty country, though the distinction may be made that it possesses much scenery of beauty—a weird, magnificent beauty coupled with desolation; for, though Iceland is not the icy waste that distant popular fancy would make it, it fared less fortunately at the hands of another of Nature's great forces, fire. The land is actively volcanic, and in the interior, on every hand, are the evidences of great fiery outbursts of the past. To tourists it presents none of those scenes which have made other lands popular: no forests, no rich meadows, no prosperous-appearing farms with beautiful gardens.

Ages ago Iceland was thrown up from the ocean by volcanic action. The most famous of the island's hundred-odd volcanoes is Hekla—perhaps because it was so effectively used in the preachings of the medieval monks and missionaries to symbolize the descent into hell. Its eruptions often have been accompanied by tremendous earthquakes and have wrought great destruction to life and property.

Earthquakes are inescapable in a volcanic region, and Iceland has had its full share of these devastating tremors.

### EARTHQUAKES REVIVIFIED THE ISLAND'S DORMANT GEYSERS

The shocks of 1896, while destructive in the main, had at least one by-product that might be classed as constructive. They breathed new life into the world-famous Great Geysir (see page 475), which, if not entirely dead, had at least become a rather indifferent performer. It was suddenly rejuvenated and all the smaller geysers in the vicinity spouted simultaneously. Several new ones were also formed.

Lord Dufferin describes the land in the immediate vicinity of Geysir as being infested with many tumors and boils, for in a hundred places are seen the bare spots and mounds of wet clay or siliceous rock, where the hot springs bubble up, either crystal clear or gray and heavy with mud.

Hot springs are not, however, confined to the vicinity of Geysir; they are found throughout Iceland, and in almost every valley are seen clouds of white steam.

These fuming springs have had a marked

THE "ISLAND" LOADING HERRING AT ISAFJÖRDUR

Iceland's salted and spiced herring find a ready market in Sweden; the dried cod go to Spain.

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THE SCHOOLHOUSE AT ISAFJÖRDUR

Illiteracy is practically unknown in Iceland. The inhabitants speak an old Norse language, and they have kept their tongue so pure throughout the centuries that the average Icelander of to-day is able to read his literature of the 12th or 13th century with greater ease than an American or an Englishman can read an early edition of Shakespeare's works.

Photograph by Herbert Felton

HANDLING THE DAY'S HERRING CATCH AT SIGLUFJÖRDUR

The fresh herring are brought in from the fishing ground by trawlers. As a boat approaches the harbor it hoots to a prearranged code, then, according to the factory to which the trawler is going, a corresponding hoot from the factory is given. In three minutes the jetty that was deserted is crowded with several hundred men and women ready to deal with the catch, which is unloaded into huge troughs on the quay. Girls cut off the heads and clean the fish, then toss them into hampers. These are taken to washing tanks, where the fish are thrown in and washed thoroughly, ladled out, and taken to other girls who have stacks of trays containing approximately equal parts of sugar and salt, about a twentieth of mixed spice, and a quantity of bay leaves. The packing now proceeds, with alternate layers of fish and spiced salt, until the barrels are full. Then coopers put heads in them and they are rolled off to a storeroom, where two girls complete the job, one drilling a hole in each barrel, the other filling it with as much water as the contents will absorb, after which a bung is driven home, and the shipment is ready for Sweden.

effect on the nomenclature of the land. Reykjavik means "Smoking Harbor"; Reykjanes, "Smoking Point." Reykholt, the home of the historian Snorre Sturlusson, means "Smoking Hill." On every side is found that Reyk, meaning "smoke."

### A LIFE OF ISOLATION ON THE HAY FARMS

Owing to the absence of good roads in the island kingdom, the mail service is hardly calculated to keep one freshly in touch with the world and its affairs. Once a month a postal caravan traverses a fixed route, leaving the letters at a few designated farms, from which the rest of the inhabitants must do their own collecting.

No wonder the Icelandic farmer, leading such an isolated life, is glad to receive the stranger, shelter him, and ask him questions!

### LACK OF FUEL IS ICELAND'S GREATEST HARDSHIP

There is a curious custom throughout Iceland of calling the living-room, which is also the sleeping-room for the whole family, the "bathroom." This is said to have come about in the following way:

According to the sagas, the island was once full of forests, which furnished ample fuel for the comfort-loving Vikings. They loved their hot baths, and in each home the favorite room was the one which contained the sunken tub. Stones were heated in bonfires and thrown into the water to bring it to the right temperature.

© Isobel Wylie Hutchison

SIGLUFJÖRDUR, THE SIXTH CITY OF ICELAND

The harbor entrance is distinguished by bold masses of lava contrasting with bands of red tufa.

© Isobel Wylie Hutchison

"THE HERRING'S LAST HOME"

These barrels are ready to be filled with the catch at Siglufjördur. Both Siglufjördur and Isafjördur, the herring capitals of the island, are within half a degree of the Arctic Circle. The herring trawlers which frequent these ports are equipped with nets 115 fathoms long and 23 fathoms broad. An ordinary day's catch is 600 barrels (see, also, page 501).

A CODFISH CURING GROUND

In the foreground are two sacks of dry codfish ready for storage and transportation.

Photographs by Herbert Felton

PUTTING SPLIT CODFISH OUT TO DRY IN THE MORNING

The fish are split open and cleaned by the seashore, then laid out to dry in the sun on a leveled bed of lava. This one covers about 80 acres. At nightfall they are collected and put in large piles and covered with white waterproof sheets (see above). Next morning these are unpacked and the fish once again laid out to dry.

A CODFISH FACTORY IN REYKJAVIK (SEE, ALSO, PAGE 503)

Iceland's fisheries comprise the nation's greatest industry. A large percentage of the country's catch is sold to Spain, and when the price of cod declines in Barcelona there are hard times in Reykjavik. In order to avoid a Spanish import tax on dried fish, Iceland has modified her prohibition law and now admits wines from the southern country.

© Isobel Wylie Hutchison

UNLOADING EMPTY BARRELS FROM NORWAY

Photograph from *The American-Scandinavian Review*

ICELAND WOMEN ARE AS CAPABLE HAYMAKERS AS THE MEN

A VILLAGE ON THE SOUTH COAST OF ICELAND

The principal occupation of the inhabitants of such settlements is fishing. In the foreground the native Icelandic ponies are being shod for use in the hayfield.

Photographs by John A. Manley

AN ICELANDIC FARMHOUSE, BUILT OF LAVA FROM THE FIELD IN WHICH IT STANDS

The corrugated roof is modern; the older houses are covered with sod. A photograph of these houses gives the impression that they are very uncomfortable because so low as to allow only children to stand upright beneath the rafters. But actually, for the sake of warmth in winter, the walls are sunk into the ground and the floor is two, three, or even four feet below the outside surface.

THE COMMUNITY FUEL YARD

The peat pits are usually owned by the city or the town near which they are located, and all the inhabitants dig their own fuel and pay a small price for the privilege.

Photographs by John A. Manley

WINTER STORAGE FOR PEAT

Large farms and small villages have a number of these storage places. The peat, piled in the foreground, is drying after having been freshly dug in the neighborhood. When it has dried it will be stored in the long building in the background. Coal is excessively high in Iceland, especially in the interior, on account of the transportation problem; it must be carried in hampers on the backs of ponies.

Photograph courtesy Roger Nielsen

FISHING BOATS OFF THE ROCKY COAST OF ICELAND

The Icelanders have been slow to adopt the steam trawler and the motorboat in their fishing industry. Until a few years ago, the open rowboat was used almost exclusively.

Photograph by Gilbert Grosvenor

AN ICELAND SCHOONER LEAVING BADDECK HARBOR, NOVA SCOTIA

The ship has come to Cape Breton Island's forest-clad shores for lumber. Timber is one of the most pressing needs of the Icelander (see text, page 501). Note the Iceland ensign flying at the mainmast.

A TUG COMING OUT FROM KAUPSTADUR, WESTMAN ISLANDS

The town lies in a hollow behind the harbor, under the shadow of a volcano. On the right huge masses of rock rise 500 feet straight up out of the sea.

Photographs by Herbert Felton

SHIPPING AN ICELAND PONY AT SEYDISFJÖRDUR

If the prospective voyager is noted as a kicker, his four feet are tied together before the girdle is fastened around him. Iceland ponies live by grazing in summer, with small amounts of hay, supplemented by the heads of dried codfish, in winter.

Photograph courtesy Roger Nielsen

THE ROYAL GLIMA, ICELAND'S NATIONAL WRESTLING SPORT

With the exception of the ancient Greek sports, the Glima is the oldest national sport in the world.

However, as the forests disappeared, and with them the fuel, the hot baths disappeared also; but the room kept its name. Although changed to a general living-room, it is still called the "bathroom."

A saving of fuel is now being effected to some extent by the use of the heat that Nature furnishes so lavishly in the form of hot springs (see pages 478 and 481).

Another possible remedy for Iceland's fuel scarcity is hydroelectric power. Some of the towns already have municipally owned power plants which utilize waterfalls, and some progressive farmers have small plants of their own.

### AN ADVENTUROUS INDUSTRY IN THE WESTMAN ISLANDS

The advent of electricity, of course, paves the way for manufactures. To-day practically the only industry of the island, besides sheep-raising and farming, is fishing. The floating population swings back and forth—to the farming regions in harvest time and to the sea during the fishing season. With a surplus of electric power, factories of various sorts may be established.

In the Westman Islands (Vestmannaeyjar), a few miles south of the Icelandic mainland, the fisheries yield nearly $1,000,000 annually, and there is proportionately more wealth among the 3,000 inhabitants of this little archipelago than among the 100,000 in the whole of Iceland proper (see map, page 470).

Each winter and spring thousands of workmen flock to the Westman Islands, and it is possible for an unskilled worker cleaning fish, receiving his pay on a piecework basis, to make from two to four dollars an hour.

These rocky, sheer-walled Westman Islands have an adventurous industry built on the taking of young birds and eggs from the cliffs at much risk to the collector, who often has to dangle from a rope to reach the nests.

The native birds are a source of income to the Icelander. The down which the eider duck plucks from its breast and uses to line its nest is collected, cleaned, and shipped to Europe for high prices.

The puffin, a peculiar, parrotlike seabird, has difficulty in flying and is easily caught in long-handled nets. Its feathers are used for down and the flesh, which is quite palatable, is eaten in all the coast towns.

That the Icelanders are confronted by many hardships cannot be denied, and it is a source of surprise to many people that, faced by such a hard life, the natives do not emigrate in larger numbers.

### INTENSE LOYALTY TO ISLAND HOME CHECKS EMIGRATION

In spite of adverse conditions, in spite of earthquakes and volcanoes, and the absence of luxuries, the Icelanders cling to their land with fierce pride.

They have a national life which is different from that of any other land in the world. One story which has won much favor in Reykjavik is that of a young Icelander in Canada, who, upon being asked what nation he hailed from, responded, "I don't come from no —— country; I'm an Icelander!"

They feel strongly their one-time glory and value highly the culture and civilization that they built practically without outside help and in which the Iceland of to-day has its roots. Not only have they long ranked among the most literate people in the world, but they possess a broad knowledge and excellent taste in literature.

The people of Iceland have a great literature of their own in the old sagas, and many of their modern poets are especially gifted. Their folk songs are popular throughout the country and rank with the best of any nation.

Iceland was the first country to accord women a vote in municipal affairs, and here they may also retain their maiden names after marriage.

In 1874, two years before the United States celebrated the one hundredth anniversary of its existence, Iceland observed the one thousandth anniversary of its birth!

### THE NATION'S NATIONAL ANTHEM IS DEVOID OF MARTIAL SPIRIT

The national hymn, which was written and adopted at the time of this millennial celebration, is an interesting study when compared with those of other countries. With all the pride they display toward strangers, there is not a suggestion of arrogance here—no warlike spirit, no exaggerated praise of their land, called forth by a blinding patriotism. But the hymn is popular, and its fine, rousing melody is sung everywhere. Kneeland gives the following translation:

O God of our land, O our land's God,
We praise Thy holy, holy name.
From the solar systems of the heavens
wind Thee a wreath,
Thy legions the times' collections.
Before Thee is one day as a thousand
years,
And thousand years one day, not more,
One eternity's small flower with quivering tears
Which adores its God and dies.
Iceland's thousand years,
Iceland's thousand years,
One eternity's small flower with quivering tears
Which worships its God and dies.

In 1918 Iceland received a constitution which made it an independent nation, free from Denmark, retaining only the same king and having a few convenient arrangements regarding foreign relations.

Photograph from Isobel Wylie Hutchison

MASTERS OF THE GLIMA

Differing radically from the Greco-Roman style of wrestling, the game in Iceland depends more upon suppleness than on strength or weight.

# THE INDISPENSABLE SHEEP

ADAM himself may have been the first shepherd. Herding sheep was among the earliest tasks known to man. And these now placid, helpless animals, with their more canny cousins, the goats, were, perhaps, the first of all creatures to be domesticated.

Primitive man, long before he bothered to record any history, had tamed his sheep, and knew the delights of mutton stew and "woolens" in winter.

It was in Asia and Europe that sheep first appeared. Then restless man, migrating first in nomad bands to Egypt and to India, carried his tamed herds with him. As dugouts grew to war canoes, then to clumsy windjammers that spanned the seas, sheep went aboard as fresh meat for the crew. Here and there, first by chance and then design, these animals were put ashore in foreign lands.

So the sheep, like the horse and cow, were pioneers among globe-trotting animals. To-day millions of these wool-bearing, chop-yielding creatures literally cover the earth. From far-away New Zealand go great shiploads of mutton to the carnivorous British Isles, where the annual consumption of mutton per capita is sometimes 27 pounds!

With his wool, his mutton, and the soft leather from his tanned hide, probably no other animal has aided man so much in his rise from savagery to civilization.

The domestic sheep has wild kinfolk, like our Western bighorn, the Mongolian argali, the maned sheep of Ethiopia, and the mouflon of Corsica and Sardinia; but all family resemblance to its free, self-reliant cousins has passed away. Now the sheep depends on man not only to lead it to food and drink, but to protect it from wild animals. In fact, in some parts of our West ewes are put in tents warmed with stoves when lambs are expected! So timid has the domestic sheep become that a sheet of paper blown suddenly by the wind may stampede a whole flock.

To Virginia, in 1609, came the first sheep known to the colonies. By 1814 their number had increased to 10,000,000, in spite of wild animals, Indians, and hard winters. But even before 1609, the Spaniards had landed sheep in Mexico. In time these spread northward.

By 1884, the peak year of our sheep industry, the United States had 50,627,000 of these animals. Their number began to decline as grazing lands were converted into farms.

The merino, originated in Spain in the 15th century, is famous for fine, heavy wool. It has been used to improve other short-wool breeds. Merino rams, brought to the States in the last century, sold at fabulous prices. Gradually improved flocks spread westward, over the Great Lakes region, and down into Ohio. As farms expanded, sheepmen were pushed westward—to Texas, Montana, the Pacific coast. Now most of our sheep flourish west of the Mississippi.

American merinos grow some of the world's best wool. But when a demand came for better mutton, English breeds, like Cotswold, Southdowns, Hampshires, Shropshires, and Oxford Downs, were imported. Other popular breeds are the Delaine Merino and the Rambouillet.

Unknown here, but familiar to American tourists in the Near East, is the fat-tailed sheep, a long-suffering creature whose tail sometimes grows to the gigantic weight of 75 pounds.

### THREE BILLION POUNDS OF WOOL USED ANNUALLY

But it is wool, after all, that has made men grow so many sheep. Next to cotton, wool is man's chief dependence for clothing. It is a big item in world trade Close to 3,000,000,000 pounds are used each year.

Though the United States ranks third among the great wool-growing nations, it has never raised enough to meet its needs.

Nearly half the world's wool comes from the Southern Hemisphere; but the greater part is used north of the Equator, where population is denser.

A map of sea trade routes, showing the paths taken by wool cargoes, suggests that it is cheapest to raise sheep in lands where farming is backward; also, because of its high value per pound, wool can be shipped at a profit farther than any other farm

© Charles J. Belden

A NEWCOMER TO THE RANGE

On some Western sheep ranges big tents warmed by stoves are provided for ewes expecting lambs.

Photograph by Charles J. Belden

BEFORE AND AFTER

The average weight of the fleece from a range sheep is from six to seven pounds. The United States ranks third among the wool-growing countries of the world, being exceeded in output by Australia and Argentina.

© Charles J. Belden

A BAND OF RANGE SHEEP ON WINTER GRAZING GROUND

Sheep can go for days without water; when feed is succulent they may even get along for weeks without drinking. Because of this, many desert areas

© Charles J. Belden

A HERDER AND HIS FLOCK LEAVING THE BEDGROUND FOR A DAY'S GRAZING ON THE HILLS

Most sheep from Western ranges, as well as those raised in the Central States, are shipped to Chicago or Missouri Valley packing houses. From these packing houses dressed mutton goes in cold storage to Eastern towns and cities.

© Charles J. Belden

ON HIGHLAND PASTURES

In 1884 the sheep industry in America reached its peak. Till then the number of sheep had kept pace with the growth of population; but now the sheep are outnumbered three to one.

© Charles J. Belden

FAT LAMBS LEAVING THEIR SUMMER RANGE FOR THE RAILROAD

When an experienced buyer inspects lambs he grades them for market by conformation, quality, and finish. To judge them he usually handles them, not trusting to appearance alone. To the untrained eye there seems to be no difference between a fat and a lean unshorn lamb.

© Charles J. Belden

"THEY ALSO SERVE WHO ONLY STAND AND WAIT"

By crossbreeding and selection, American wool growers have increased the average fleece weight from 2 pounds in 1840 to from 6 to 8 pounds to-day. In our Southeastern States the average is still only from 3 to 5 pounds, however.

© Charles J. Belden

WHEN WINTER COMES

Ewes and lambs without shelter from a belated snowstorm.

Photograph by Charles J. Belden

SHEEP ENTERING ONE OF THE WORLD'S LARGEST PASTURES

The vast ranges of the National forest reserves provide pasture for many million head of stock each year. Officers of the U. S. Forest Service are counting a band of sheep as they cross the reserve boundary.

© Charles J. Belden

ALL ABOARD FOR THE CORN BELT

These range lambs are waiting to begin their journey on the "live-stock Pullmans."

© Charles J. Belden

THE WINTER BREAD LINE IN WYOMING

Sheep can stand much cold. Long ago Vermont was the center of our sheep industry. Now sheep have largely disappeared from the Atlantic seaboard, and to-day Texas leads in numbers, with vast herds, also, in California, Idaho, Ohio, Montana, Oregon, Wyoming, Utah, and New Mexico.

© Charles J. Belden

THE SHEEP HERDER'S JOB IS NO SINECURE

Hardy and able to shift for itself, the sheep nevertheless needs close care. On the Western ranges predatory wild animals, poisonous plants, and exposure on dangerous grazing grounds contribute to the mortality of a flock. Cold, rainy weather at lambing time may mean heavy losses unless herds have the closest attention.

© Charles J. Belden

THE WOOL-MAKERS OF THE WEST

A herd of fine wool bucks, such as are used to improve the grade of range sheep. Their curved horns are suggestive of kinship with the wild "bighorn" of the Rockies. The merino was the ram first imported to build up American flocks.

© Charles J. Belden

RETURNING FROM SUMMER GRAZING GROUND

Range sheep are brought into corrals for the purpose of sorting out the lambs for shipment to market. Sheep thrive on the fattening forage of mountainous countries. In summer they venture to high altitudes, sometimes above the timber line.

© Charles J. Belden

FEEDING SHEEP UNDER THE SNOW-CAPPED PEAKS OF THE ROCKY MOUNTAINS

The animals are driven to the heights in May and June. In September and October herds are brought down and separated; fat lambs go to market and breeding stock goes on winter pasture.

© Charles J. Belden

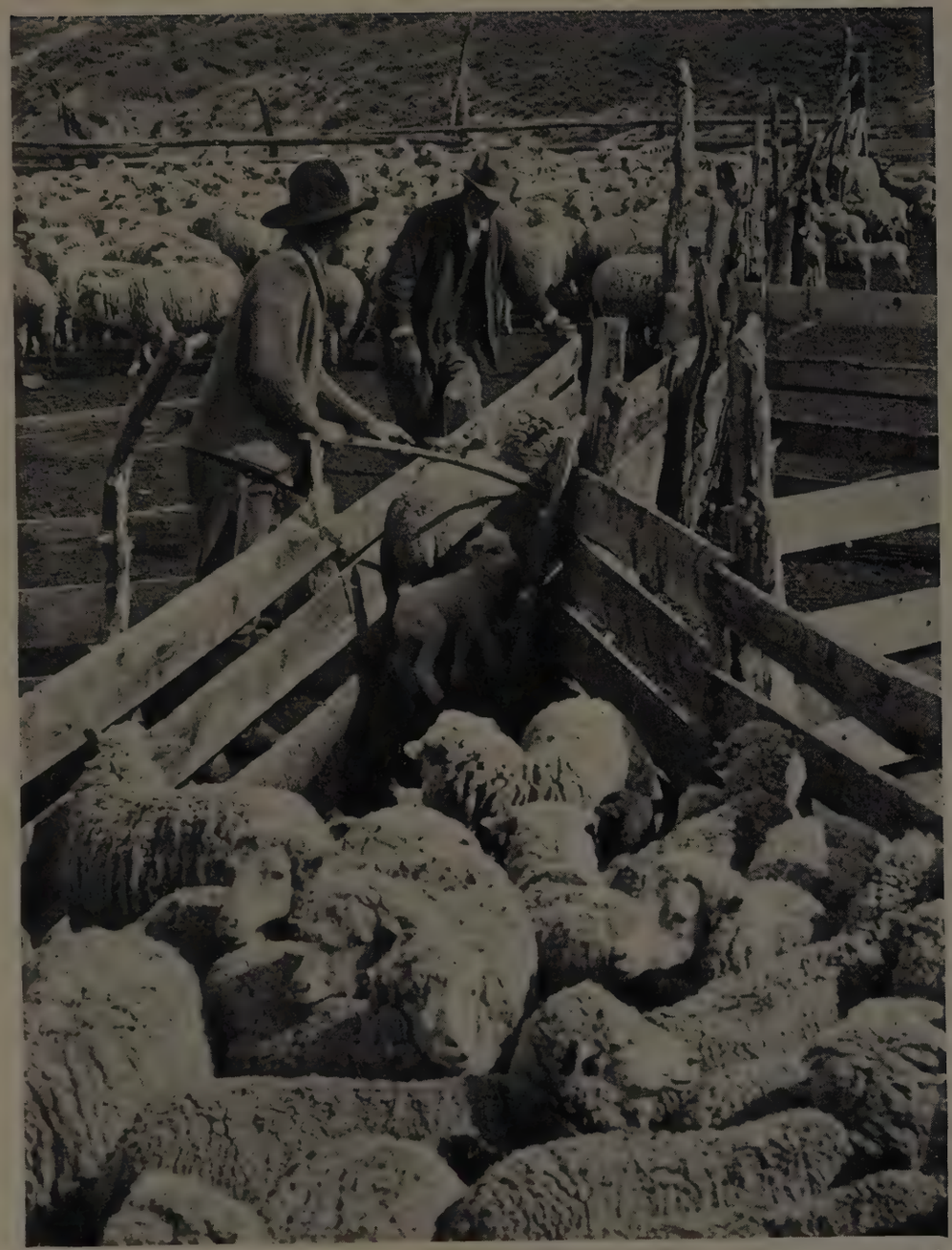
WHERE SHEEP AND WOOL PART COMPANY

This shearing plant is located on the range, where it is easily accessible to the flocks.

Photograph by Charles J. Belden

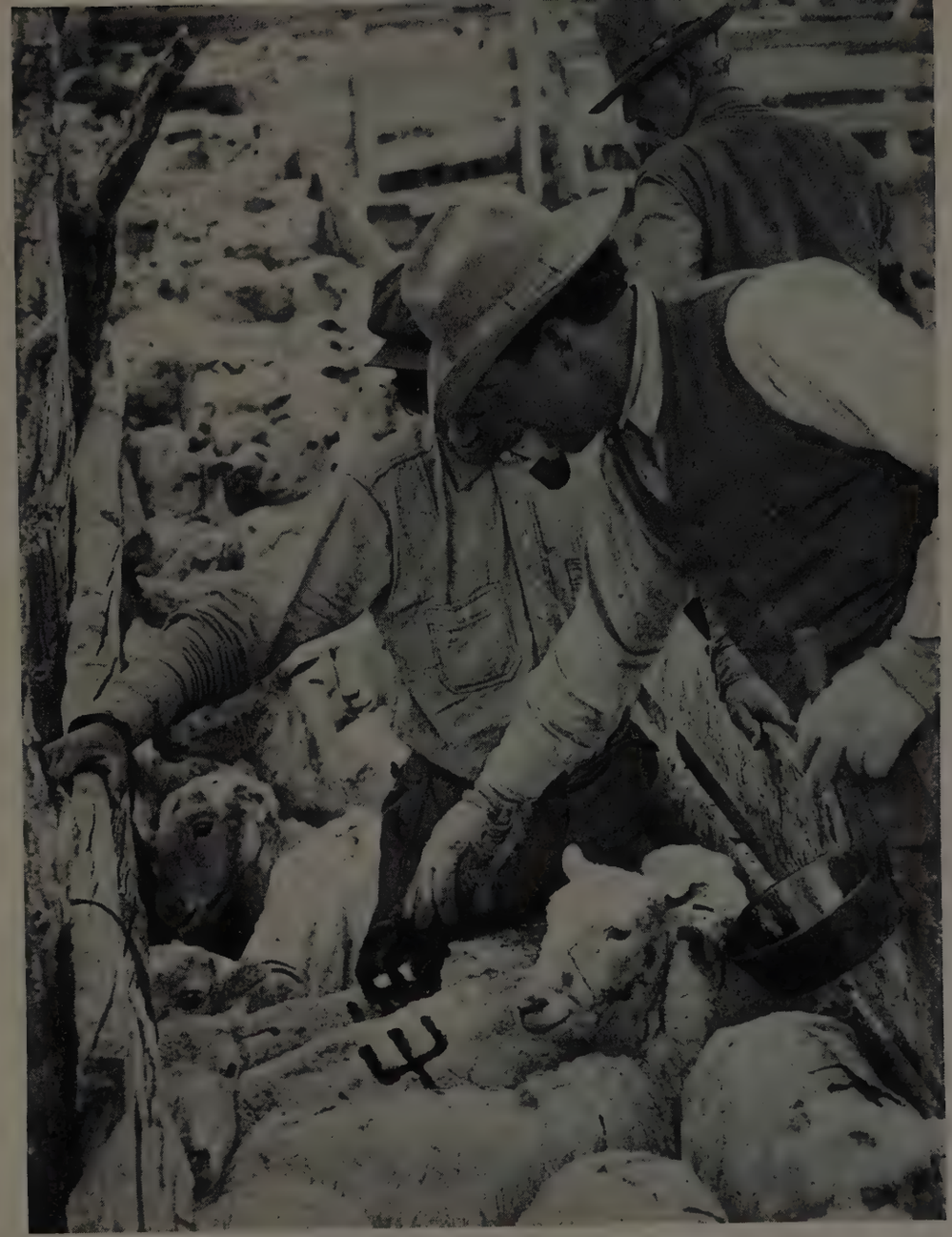
WOOL WAGONS OF THE WESTERN HILLS

Out in the sheep country wool is often hauled 100 miles or more to the railway. Because of its high value per pound, it can be hauled farther at a profit than almost any other farm product.



AT THE DODGE GATE

Before the ewes are put in the shearing pens they are separated from their lambs by means of a specially constructed gate. The lambs go into one corral and the ewes into another.



Photographs by Charles J. Belden

THE SHEEPMAN'S TRADE-MARK

After shearing, the sheep are branded with a specially prepared paint that will not wash off. Each owner has a different brand, and by this mark he can claim any sheep which strays from his flock.

© Charles J. Belden

A COLD DINNER FOR THE WOOLLIES

A band of range sheep has been brought in to feed during a severe storm.

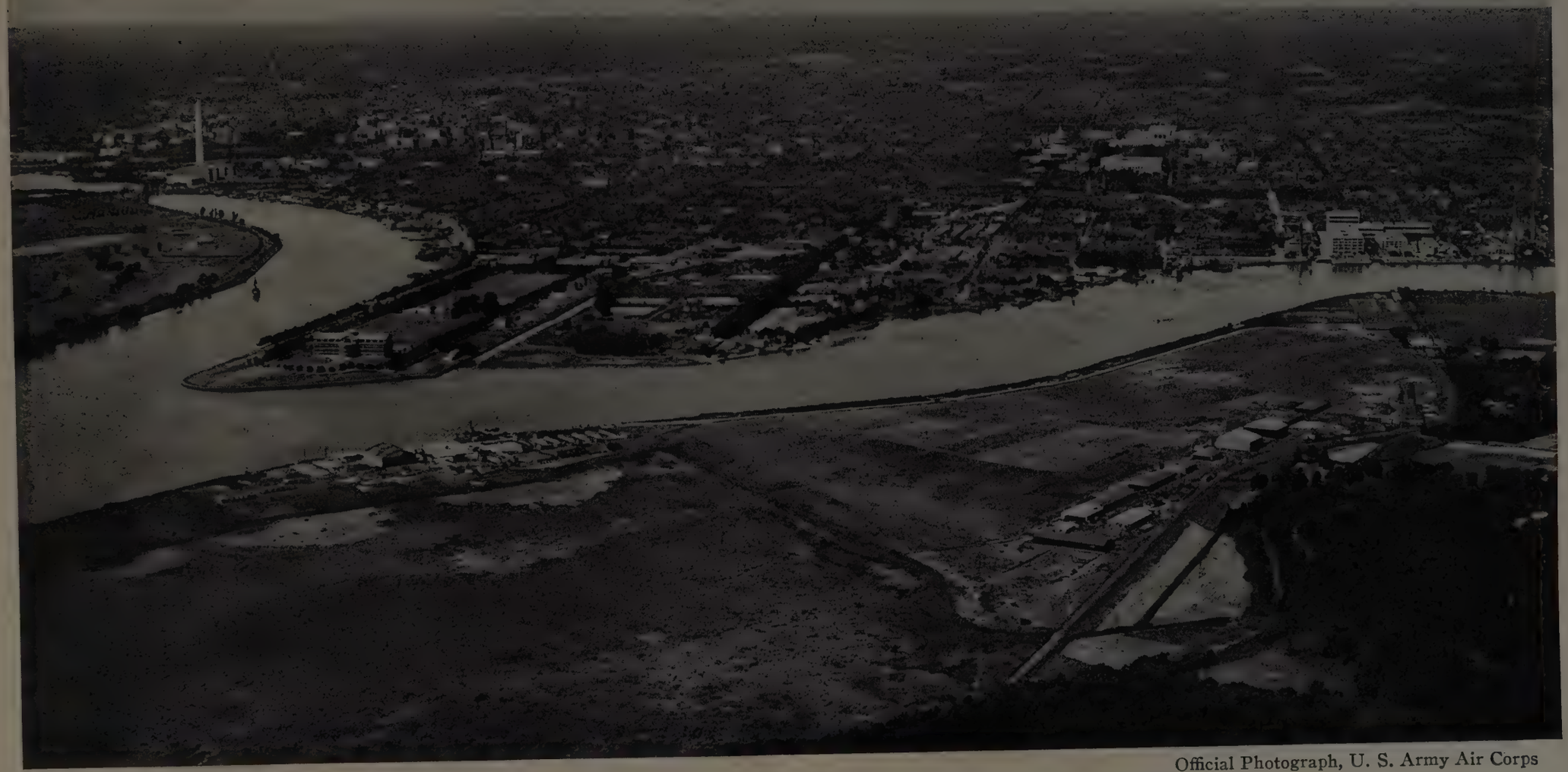
product. This is why wool-growing is still so much of a frontier enterprise.

The heaviest exporters of wool are the newly developed and as yet sparsely settled lands of Australia, Argentina, New Zealand, South Africa, and Uruguay. These countries produce fine wools; coarser grades, for carpets, come from China, India, and western Asia. Though the world wool trade centers in Europe, the port of Boston ranks second among all markets.

The weaving of cloth from wool was one of the earliest industries developed in this country. A few English families settled in Rowley, Massachusetts, built a mill there in 1643, and were the first to make woolen cloth in America. Laws were early passed in New England to promote the woolen industry, and to this day our woolen mills are largely centered in the North Atlantic States.

It is an odd fact that, although the United States uses from 550 to 750 million pounds of wool a year, it has no public wool market, like the Chicago or Kansas City grain and meat markets. Nearly all this huge pile of wool is bought by private agreement.

Though any future expansion of the sheep industry will be at the cost of cattle and wheat production, the growing world will insist on more sheep. The human race wants wool; and to-day's clip is hardly more than sufficient for present needs.



Official Photograph, U. S. Army Air Corps

THE FAREWELL GLIMPSE OF WASHINGTON AS THE LATIN-AMERICAN FLIGHT BEGAN

In the right foreground is Bolling Field, at Washington. To the left, at the river's edge, is the United States Naval Air Station, opposite which, on the point of land, is the Army War College. At the left is the Speedway, encircling Potomac Park, with the Washington Monument in the distance. The group of white buildings to the right includes the U. S. Capitol, House and Senate Office buildings, Library of Congress, Union Station, and City Post Office.

Drawn by A. H. Bumstead

THE ROUTE FOLLOWED BY COLONEL LINDBERGH IN HIS FLIGHT OVER 13 LATIN-AMERICAN COUNTRIES

The journey of nearly 9,500 miles from Bolling Field, District of Columbia, over Mexico and Central America to Bogotá, Colombia, and return by way of the Lesser and Greater Antilles, to St. Louis, was made in exactly two months, with only 125 hours of actual flying time.

maps of Mexico I had been able to obtain in the United States were inaccurate and showed few natural landmarks.

Occasionally I passed over a winding railroad, but upon consulting the map I could find none that were not straight.

After following one of these for a time, I arrived over a fair-sized village and flew low past the station to pick up the name from its signboard.

It did not, however, correspond with the names of any towns on the map. After several other similar attempts, I decided that there had been a disagreement somewhere, or that the towns had been renamed and I would have to locate myself by some other method. [Later, in Mexico City, I was presented with Mexican maps, which were surprisingly accurate and by which I was able to navigate in Mexico as easily as in the States.]

I then climbed to an altitude of over 12,000 feet.

## MOUNT TOLUCA PROVES TO BE A SIGNPOST

The rivers below were flowing toward the south, and far to the east was a high mountain peak towering above the others in its range. Directly underneath, the country was rough and uninhabited.

I located my position approximately by the direction of the rivers and headed east, toward the peak, which, from my map, appeared to be Mount Toluca.

Photograph courtesy Excelsior, Mexico City

CAVALRY AND MOTORCYCLE POLICE ESCORT THE FLYER TO THE UNITED STATES EMBASSY IN MEXICO CITY

Photograph by American Photo Supply

THE KEYS TO THE CITY OF MEXICO

These symbols of the freedom of the Capital City of the Republic were presented to the American flyer by Mayor Sánchez.

Photograph courtesy Excelsior, Mexico City

A TINY DAUGHTER OF MEXICO PRESENTS VIOLETS TO AMERICA'S LONE EAGLE

Seated at Colonel Lindbergh's right is President Plutarco Elías Calles, of Mexico.

Photograph by American Photo Supply

SPECTATORS APPLAUD AS THE AVIATOR IS GREETED BY THE BULLFIGHTER

Before 35,000 people in the arena at Mexico City, the popular matador, José Ortiz, salutes Colonel Lindbergh, while cameras click in the foreground.

Photograph by American Photo Supply

MEXICO'S LEGISLATORS WELCOME COLONEL LINDBERGH

In the hall of the Chamber of Deputies the aviator was tendered a reception by the Mexican lawmakers, who were called into special session for the purpose. The young man in a light suit, facing the guest of honor, is the leader of the majority party and speaker of the House. On the walls are inscribed the names of some of the Republic's national heroes.

About an hour later I came to the largest city I had passed over since leaving Tampico.

I again attempted to shoot the station, but without result. After circling three times over the city, however, I noticed a sign saying "Hotel Toluca," painted on one of the buildings near the station.

After locating Toluca on my map as being about thirty miles west of Mexico City, I headed east, and a few minutes later, after passing over a low ridge, the city itself appeared in the distance.

I had lost between two and three hours by my mistake and flown nearly far enough to have reached the Pacific Ocean and returned to Mexico City, had I followed such a course accurately.

I landed at the airport 27 hours and 15 minutes after taking off from Bolling Field, or one hour and 15 minutes over my estimated time.

When flying becomes common each town and city will have its name painted on some prominent building. Many of our progressive cities in the States have already done this and thereby received the silent gratitude of many a pilot who has passed over on a stormy day.

### THE PRESIDENT OF MEXICO AND THE AMERICAN AMBASSADOR WELCOME THE FLYER

A large crowd had assembled on the field. Immediately after landing I was welcomed by President Calles, who had extended to me the invitation to come to Mexico, and by Ambassador Morrow, who was my host during the only too short time I was there.

The day after my arrival I flew with some of the Mexican pilots.

The flying field here is excellent, although I never saw the wind change so fast in so short a time. This may be because Mexico City lies in the bottom of a bowl in the mountains. The wind shifted as much as 180 degrees in a few seconds.

We flew all over Mexico City. I thought of the days when Cortez fought his way into this city; but it no longer resembles

Photograph by American Photo Supply

WITH THE ALDERMEN OF MEXICO CITY, THE FLYER VISITS THE BEAUTIFUL GARDENS OF XOCHIMILCO (SEE TEXT BELOW)

The floating gardens of this ancient Indian stronghold in the Aztec lake country, ten miles from the Mexican capital, supply the city markets with vegetables, fruits, and flowers (see "The Venice of Mexico," in the NATIONAL GEOGRAPHIC MAGAZINE for July, 1916).

the home of the Aztecs. With its long, wide, straight streets and avenues, it looks more as though laid out by an artist.

It is hard to realize that this city is nearly 8,000 feet above the sea; but you realize this when you take off from the flying field. The air is so light that a long run is necessary. The Mexican pilots have this to contend with in all of their flying activities, yet are training students daily, even under the adverse conditions brought about by near-by mountains, variable winds, and high altitude.

### SEEING THE WONDERS OF MEXICO

December 18th was one of those wonderful Mexican days. I went to see an exhibition of roping and riding at the famous Rancho de Charros, and in the afternoon I attended a bullfight, where one of the matadors presented me with a beautiful cape (see illustration, page 534).

Late in the evening we went for a motor ride out into this valley of romantic history, amid remains of old Aztec and Toltec civilization (see page 545).

It is hard to believe now that once the whole valley was a great lake, with small islands on which ancient cities were built.

Always I found something new and surprising, as when they took me to see the "floating gardens" in Xochimilco. Once these islands were said to have floated; to-day they seem well anchored. Moving through the narrow canals among these islands was like a trip through a primitive Venice. Our boat passed many gardens where vegetables and flowers are

grown for sale in the cities.

Once all of Mexico City was like Xochimilco, I was told. It was so when Cortez came—just a series of little islands. Gradually the canals were filled up, the lake was drained, and now only these small beauty spots are left. But as we were poled along, it was like moving into another world of hundreds of years ago.

During my visit in Mexico City I had the honor of taking the President of Mexico for his first flight. He was able to look down upon his palace at Chapultepec, into the patios, the gardens, and upon the walks laid out in color beneath him.

It is easy to understand, from the air, why the ancients chose this site for their capital.

We flew over the city and in a wide circle which carried us out over the plains around it.

Photograph by Wide World

THE AVIATOR SEES MEXICO BY BOAT

Colonel Lindbergh and Ambassador Morrow ride through the canals at Xochimilco, the Venice of Mexico (see text, page 536).

One day the Mexican Army pilots took me as their guest to Cuernavaca. This gave me a new idea of the beauty of the country. It took us two hours and a half, however, to make a trip which a plane could have done in 30 minutes.

### VOLCANIC PEAKS MARK THE ROUTE FROM THE MEXICAN TO THE GUATEMALAN CAPITAL

It was 6:35 on the morning of December 28 when I took off into the clear, cool atmosphere and turned southeast on an airline for Guatemala City.

This flight was unusually interesting, from the viewpoint of scenery, all of which was new to me; but, unfortunately, the ground was not always in sight.

Soon after leaving Mexico City low fog and clouds appeared, covering many of the valleys. Some fog areas were as much as 50 miles long. They lay chiefly over the lowlands, especially toward the Gulf. I did not see the Gulf, but did get a glimpse of the Pacific Ocean, at one time, about 50 miles away.

Mountain-peak volcanoes, numerous in this region, were visible everywhere, with mist-filled valleys between them. Several volcanoes, both in Mexico and Guatemala, were smoking—that is, there was a slight vapor of steam rising from their cones.

Photograph by American Photo Supply

A REVOLVING CIRCLE TEHUANA DANCE IN THE MEXICO CITY STADIUM

Descendants of the once powerful Zapotecs, the Tehuana women, famous for their beauty and graceful dances, much resemble the women of Burma. Like the orientals, too, they delight in brilliant colors and much jewelry. This Tehuana dance was staged during the fiesta in honor of Colonel Lindbergh's visit.

Photograph by American Photo Supply

BEAUTY LOOKS UP AT THE AIRMAN, IGNORING THE CAMERA

In this group of Mexico City's youth and pulchritude, assembled for one of the Lindbergh festivals, the simple "sport hat" of Paris contrasts with the highly decorated sombrero of Old Mexico. In the foreground hangs a Mexican serape, or blanket. The best of these are made by Indians, on hand looms, of wool colored with vegetable dyes that never fade.

Photograph by American Photo Supply

AMERICA'S AVIATION ACE PARTICIPATES IN THE DEDICATION OF A LIBRARY

The flyer is seated on the platform of the Lincoln Library, while the head of the Library Division of Mexico's Department of Public Education (right) makes her dedicatory address.

Photograph courtesy Excelsior, Mexico City

YOUNG PATRONS OF THE NEW LINCOLN LIBRARY SURROUND THE AMERICAN FLYER

To Colonel Lindbergh's left and on the step below stands the aviator's host, Ambassador Morrow, who bore much the same relation to his gala visit to the Mexican capital that Ambassador Herrick did in Paris, after the *Spirit of St. Louis's* transatlantic flight in May, 1927. At Ambassador Morrow's left is Dr. José M. Puig Casauranc, Mexico's Secretary of Public Education.

Photograph by American Photo Supply

THE GIANT PLANE THAT BROUGHT THE AMERICAN FLYER'S MOTHER TO MEXICO ON VALBUENA FIELD

At the invitation of the American Ambassador, Mrs. Lindbergh flew from Detroit to Mexico City, by easy stages, in order to spend the Christmas holidays with her distinguished son. This is the same airport at which the *Spirit of St. Louis* had previously landed.

These mountains are high and very rugged, but almost entirely covered by vegetation. Their difference in this respect from the Rockies was striking. Some of the mountains were entirely covered with palms.

Even more impressive were the small farms which men cultivate high up the slopes of these mountains. Some fields were fully 10,000 feet above the sea, and there were others clinging to the sides of the peaks at an angle of more than 45 degrees.

I flew at an average altitude of 7,000 feet and at a maximum of 12,000; but, as Mexico has an elevation of more than 7,000 feet and Guatemala City 5,000, and much of the intervening area is mountainous or a high plateau, sometimes this was not high above the ground. I flew a few hundred feet or less over some of the higher mountains, passing quite close, occasionally, to the villages.

These villages, which are mostly straw-thatched and quite individual in appearance, are not, however, seen frequently, but are very widely scattered. In fact, for stretches of 50 miles at a time there was not a single sign of human habitation. It seemed to be a vast, virgin, tropical forest, with sharp mountain peaks outstanding in it.

Villagers came outside of their houses to watch me pass. Most of them had never seen an airplane before.

My route did not take me over cities of any size between the two capitals.

### TRIPLE-MOTORED PLANES RECOMMENDED FOR DANGEROUS ROUTE

Very few places appeared where a forced landing would be possible, though I did notice some here and there. One got the impression from the air that in the case of a forced landing in much of this region it probably would take weeks to reach any habitation. The jungle in the lowlands, where it was visible through the

Photograph by American Photo Supply

REVIEWING THE PARADE OF THE MEXICAN LABOR UNIONS

In receiving this notable manifestation of good will on the part of the Mexican working classes, Colonel Lindbergh stood on the central balcony of the National Palace, which contains the office of the President of the Republic.

fog or clouds, seemed extremely thick and extensive.

I believe, however, that the territory from Mexico City to Guatemala City is practicable for commercial flying with triple-motored ships, although it probably would be better to follow along the coast line.

I flew a compass course the entire distance, depending almost entirely on the earth inductor compass.

I approached Guatemala City from the northwest, flying considerably to the north of the big volcanoes which rise between it and the Pacific.

The sky was clear over Guatemala, except for scattered clouds hanging around the horizon and over the volcanoes. The city was visible for a considerable distance. It looked white and beautiful from the air, with its houses built in squares around a court or patio and green with vegetation. The streets are blocked off, as in most cities in the United States, making one, in this respect, seem at home, despite the tropical plants.

The whole city stands out strikingly against the surrounding plateau, fringed with mountains and volcanoes, and against the extensive uninhabited or sparsely settled areas to the northwest.

### GUATEMALA CROWD BREAKS THROUGH A CORDON OF SOLDIERS

The flying had been smooth all the way from Mexico City and I made the 675 miles in 7 hours and 5 minutes.

For a moment, when landing at Guatemala, I feared people in the crowd might be injured. The first time I "dragged" the field, which is always done over unknown landing places, thousands of spectators apparently thought I was actually landing. They broke through the cordon of soldiers and swarmed over the field.

When I did land, after dragging the field once more, the crowd had been pushed back; but they broke through immediately and had crowded around the plane by the time I got it up in front of the hangar.

Ever since a trip to Panama, years before, I had wanted to see more of Central

America. But in flying one gets to see but little detail of the country beneath. These glimpses from the sky only create a desire to see the land below in a more leisurely manner. So it was with keen pleasure that I rode about, enjoying the city and its agreeable climate. It was hard to realize, amid the palms, bamboos, and strange flowering trees of Guatemala, that up in the States, at the same time, many people were shivering with the cold of midwinter.

Photograph by American Photo Supply

IN THE GARDENS OF THE AMERICAN EMBASSY AT MEXICO

At Colonel Lindbergh's right are Mrs. Dwight Morrow, wife of the American Ambassador; Mrs. Lindbergh, and Mr. and Mrs. W. B. Stout, who accompanied Mrs. Lindbergh on her flight from Detroit to Mexico City.

### THE AVIATOR IS MADE A CITIZEN OF GUATEMALA

As I found later, Guatemala City is not much different from many other Central American capitals. Numerous automobiles and many fine new buildings give this place a very modern air. Yet Guatemala City is one of the oldest centers of Western civilization. Alvarado, one of the lieutenants of Cortez, came here from Mexico 400 years ago and built the first Guatemala City. When I remember all the rough country I flew over on the way here from Mexico, I can appreciate what a difficult march it was for Alvarado and his force early in the 16th century.

The city presented me with a hand-painted scroll, making me one of its citizens; also, I heard a number of speeches in English; apparently many Guatemalans understand our language.

They showed me a remarkable physical map of Guatemala constructed by a native engineer. It shows the entire country on the horizontal scale of 1 to 10,000 and a vertical scale of 1 to 2,000. Some sharp volcanoes, which stand out like teeth on this map, six feet high, represent the 12,000-foot peaks I flew between the day before. This map is said to be unique in the world. It gave me a clear idea of the mountain ranges and the lowlands on my course to Belize, and between Belize and San Salvador, over which I flew later.

At dawn on December 30 I left Guatemala City for Belize. Visibility was not good. The city was covered with fog, and from the air, as I looked down, I could only catch glimpses of houses through holes in the fog bank, which

Photograph by American Photo Supply

LABOR UNIONS, HONORING LINDBERGH, PARADED BEFORE MEXICO'S FAMOUS CATHEDRAL (SEE, ALSO, PAGES 542 AND 546)

This magnificent edifice is one of the largest churches on the Western Continent. Tradition says its foundations are composed largely of sculptured Indian images and of fragments of building material which once formed the great Aztec temple that stood near here when Cortez conquered Montezuma. It was begun in 1573. Many wealthy Spaniards contributed ornaments of gold and silver, and a miner gave a chalice covered with gems

Photograph by American Photo Supply

THE PYRAMIDS OF SAN JUAN TEOTIHUACÁN, HOLDING THE SECRETS OF A PREHISTORIC RACE, WERE VISITED BY THE AMERICAN FLYER

The origin of this City of the Gods, 28 miles northeast of Mexico City, is buried in the past, but its immense yields of archeological data indicate that once it was a metropolis of at least 100,000 people. Two of the largest artificial mounds in North America, the Pyramids of the Sun and the Moon, dominate the area, but there are also many minor ones (see "An Interesting Visit to the Ancient Pyramids of San Juan Teotihuacán," in the National Geographic Magazine for December, 1910). The archeological zone of 494 acres is being excavated by the Mexican Government.

Photograph by American Photo Supply

"IN LINDY'S HANDS WAR'S MOST TERRIBLE WEAPON TURNS TO A DOVE OF PEACE," SAYS A BANNER CARRIED BY MEXICAN WORKMEN

stretched out 60 miles to the base of the mountains.

### THE FIRST PLANE TO FLY OVER BRITISH HONDURAS

I set a compass course straight for Belize. This carried me over much mountainous and uninhabited country. Now and then, however, I saw small grass huts with tiny cultivated patches around them; but on this whole flight I did not see one place where I might have landed without injury to the plane.

As I approached the coast, the country became less mountainous; also, a heavy fog set in and I had to fly about 6,000 feet to clear it.

Two or three times in the last two hours I tried to get under that fog, but it hung close down to the tree tops; so I had to get up again, navigating blindly by instruments.

At last I located my position about 25 miles south of Belize. To reach the city, I had to fly low along a beach fringed with coconut palms. I found the polo field and landed. Mine was the first land plane to fly over British Honduras, I was told (see page 552).

Belize is a British colony and its hospitality to me was of the good old British sort. After a night of festivity—and it was restful to enjoy once more a common language—I was taken for a launch ride up the Belize River.

Looking into the dense growth along the banks, I realized what a forced landing in that region might have entailed. The river on both sides is bordered with mangrove swamps. Even on higher land the vegetation is so dense that weeks might be required to travel any distance, where there were no trails. Several miles up the river we visited the Botanical Gardens, where the Government is experimenting with native trees and plants.

### SPLENDID DISCIPLINE AT BELIZE

In the morning the Governor, Sir John Burdon, with a band of music and many people, came to the field to see me start. Perfect order was maintained. With the spectators under control, there was no danger of hitting any of them, for which I was very grateful. It was a fine example of British discipline.

I circled over Belize; then set my course for San Salvador. The rough air joggled

© Thomas F. Lee

A HERD OF RANGE CATTLE IN A HILLSIDE FIELD OF JARAGUA GRASS

Certain parts of Guatemala are especially suitable for cattle raising, and hides rank high among this republic's exports.

the magnetic compass, and without the earth inductor, by which I navigated, it would have been impossible to fly as straight on a course. The line of flight took me along the coast until I entered Guatemala.

The scenery was unusually interesting. There was dense green jungle all over the lowlands, and the Gulf was dotted with tiny keys covered with mangrove and palm trees.

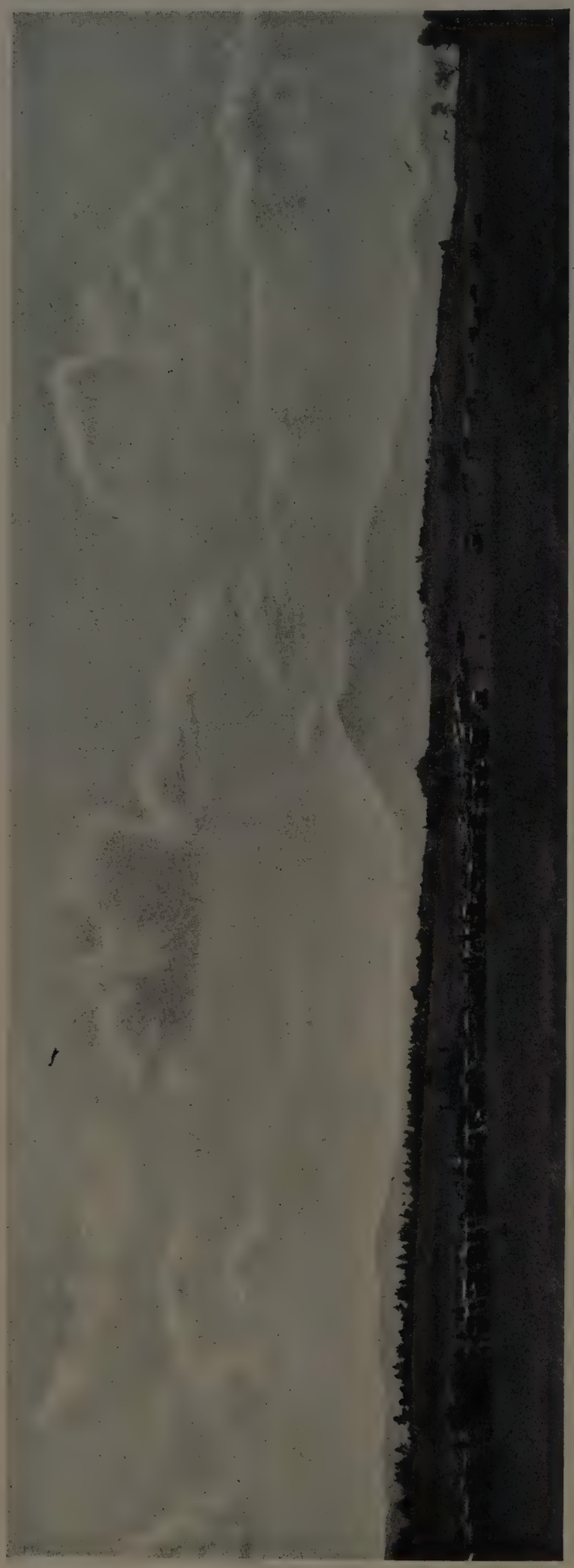
After passing West Saint Anns Creek, I left British Honduras, crossed the Gulf of Amatique, and flew between Livingston and Puerto Barrios. Below, over the lowlands, there stretched out for miles the dark-green foliage of banana plantations. Beyond Livingston I was surprised to see what appeared to be a big gold dredge, which had cut through the jungle, leaving a trail of destruction behind.

The area over which I flew was more inhabited than I found Guatemala, on the way to Belize; yet it was far from thickly settled. Population grew denser after I crossed the frontier into Salvador. In the mountains I saw more of the little grass huts, seemingly lost in the foliage, for I could see no sign of trail or road anywhere near them. Around each hut was an acre or two of cultivated ground. The Indians living here, I was told, use these small patches to grow the corn for their tortillas.

These mountains in Salvador are extremely broken, with a labyrinth of ridges and deep canyons. Most of the valleys were filled with fog or clouds. The map by which I flew was on such a small scale that on it I could cover all of Salvador with two fingers. Navigation was consequently rather difficult.

### A CORDIAL WELCOME IN SAN SALVADOR

As I approached the city of San Salvador, I saw one of the planes which had been sent out to escort me in. Apparently, however, it did not see me. I know from



Photograph by José Quevedo V.

THE "SPIRIT OF ST. LOUIS" OVER THE LANDING FIELD AT GUATEMALA CITY

Before landing in strange places, Colonel Lindbergh invariably "dragged the field," or flew low over it, several times to judge its extent and condition. Here the enthusiastic crowd which had assembled to welcome the American flyer broke through the cordon of soldiers and overflowed upon the field (see text, page 542). Far in the background rises the volcano of Pacaya.

my own experience how difficult it is to find and meet another plane when one is uncertain as to the exact direction the visitor is coming from.

Here, as elsewhere in Central America, the people were most cordial and did all they could to make my visit comfortable. When I left, on the morning of January 3, a squadron of Salvadorean planes saw me off.

I struck an airline northeast for Tegucigalpa. In fine weather and with good visibility I climbed to about 4,000 feet and passed over the cities of Cojutepeque and Sensuntepeque; then toward the mountains where the Lempa River forms the boundary between Salvador and Honduras.

### THE ROUGHEST AIR OF LINDBERGH'S FLYING EXPERIENCE

Just across the river I struck a norther. It was blowing over the mountains and bringing thick clouds. For fifteen minutes I was in the roughest air I ever experienced. It threw the plane up, down, and on its side; several times it threw me against the top of the cabin. My goggles, hanging on the stabilizer control lever, were thrown against the top of the cabin and fell in the back of the fuselage.

Rough air is caused by currents and not, as commonly supposed, by pockets. A plane passing from an ascending current into one descending is forced downward in proportion to the velocity of the

© Thomas F. Lee

A POTTERY PORTER OF GUATEMALA

The human back is still the common vehicle in regions where the roads are few. These light but bulky jars are lashed to a *cacaste,* or wooden frame. When let down, it stands like a chair and saves the fragile

THEY SURROUND THEIR HUTS WITH CORNSTALK WALLS

Corn is the staff of life in Central America. These Guatemalan Indians, whose mountain villages Colonel Lindbergh saw from the air (see text, page 541), use dried cornstalks, tightly laced together, as fences for their huts.

© Thomas F. Lee

SOME OF THE EARLIEST SPANISH STRUCTURES IN AMERICA ARE TO BE FOUND IN GUATEMALA

Long before there were any permanent European colonies in what is now the United States, the lieutenants of Cortez had explored and started settlements in Guatemala. In this massive, arched ruin of the Escuela de Cristo at Antigua, some of the walls are 8 to 10 feet thick; but even this solid masonry was seriously damaged by earthquakes in the 18th century.

currents encountered. This was the first really rough air I had struck since leaving the United States.

I found much smoother air at an altitude of 6,000 feet, approximately level with the bottom of the cloud field. As the clouds covered the mountains, I detoured slightly to the south. I was now well into Honduras and crossing the Goascorán River.

I had three different maps, and by combining this information was able to keep a fairly accurate location of my position. One map was bought at a stationery store; the second torn from a wall map; the third a page from a magazine. When two wireless towers appeared in the distance, I knew I was nearing Tegucigalpa. Over the city it was raining hard. On a hill near by cannon were being fired. I could not hear the reports, but could see the smoke and flame shoot from the muzzles. I came down, dragged the field three times, and landed.

For two days I visited with the friendly people of Tegucigalpa, and it was with real regret that I took the air on January 5 for the hop to Managua.

Most of the way I flew high—about 8,000 feet. I crossed the Honduras-Nicaragua border near the River Negro, which runs into the Gulf of Fonseca.

## SMOKING VOLCANOES MARK THE ROUTE

My course from Tegucigalpa lay straight to León, a city of Nicaragua near the Pacific coast. From it a railroad is easily followed to Managua.

© Thomas F. Lee

A PRIMITIVE METHOD OF BURNING THE GLAZE ON POTTERY

Weaving and the making of pottery are the two most important arts of the Guatemalan Indians. It is interesting to note how the Indians have adapted themselves to their environment, and particularly the way in which they utilize the natural resources found close at hand. Thus, in the region roundabout Totonicapán, the soil is not particularly suitable for agriculture, but, as good clay is available, it is the center of the pottery industry.

As I came out of the mountains, halfway on the trip, the coast appeared ahead, with the volcanic islands rising from the Gulf of Fonseca on my right. From this point on to Managua the Pacific Ocean was constantly in view on the western horizon.

In Nicaragua I passed over an extinct volcano containing three concentric craters. Several medium-sized trees were growing in the craters and there was no evidence of recent activity. According to my map, I was over El Viejo volcano—5,800 feet. About half a mile away, and perhaps 2,000 feet lower, was another. Its crater seemed about half a mile wide and looked level at the bottom. It had no trees in it, but was covered with a green sod.

Fifteen miles farther on I came to a third volcano. It was active and smoking heavily, with no trace of vegetation near by. One side of the crater was burning and throwing off dense fumes. From here on my route seemed marked with smoking volcanoes. The last one was Momotombo, close to Managua.

I had flown as high as 11,000 feet on this trip from Tegucigalpa. Above the city of León I came down close to earth and could see people running out into the streets to see the plane. I circled over the city two or three times and then headed toward Managua. This city was easy to locate because of its position near Lake Nicaragua. The field was large and well marked with a number of Marine planes lined up along the north side.

An air service between Tegucigalpa and Managua could be simply maintained, as there are plenty of landing places along the route.

At Managua the people of Nicaragua and the United States Marine flyers gave me a warm welcome. While there I was taken by motor to El Tazate, the coffee plantation of a prominent citizen of Nicaragua and a graduate of Cornell. This estate lies fifteen miles from the city, among low hills covered with banana

THE DIFFICULTIES OF RAILROAD CONSTRUCTION IN CENTRAL AMERICA ARE SUGGESTED IN THIS SINUOUS TRACK

The airplane flies straight to its destination; the locomotive labors slowly along its serpentine way. This is a part of the railway line connecting Guatemala City with its Pacific seaport, San José (not the capital of Costa Rica). In the left foreground are some of the cultivated fields clinging to the verdure-clad hillsides, which attracted the attention of Colonel Lindbergh on his flight over Guatemala (see text, page 541).

groves, mango trees, orchids, and other tropical vegetation. On the way out we passed a lake in the crater of a dead volcano, which the natives believe to be bottomless and inhabited by a huge dragon.

### FLYING LOW OVER THE JUNGLE, OBSERVING BIRDS AND ORCHIDS

I flew across Lake Nicaragua on my way to San José, the capital of Costa Rica. It was raining so hard by the time I reached the south shore of Lake Nicaragua that to keep within sight of the ground I had to fly at an altitude of 50 to 200 feet.

For the next 75 miles I flew over what seemed an impenetrable swamp. The rain clouds were so low that I had practically to skim the tree tops. I knew that, in case of necessity, I could climb up through

Photograph by V. M. Lizárraga

COLONEL LINDBERGH'S WAS THE FIRST LAND PLANE EVER TO VISIT BELIZE

Behind the golf club building, with its flags flying, rises one of the steel towers of the British Honduras Government wireless station. Despite the narrowness of this improvised landing field, Colonel Lindbergh experienced no difficulty here, thanks in large measure to the excellence of the police discipline maintained (see text, page 546).

Photograph by Keystone

AN AËRIAL VIEW OF BELIZE

The city occupies both banks of the Belize River at its entrance into the Caribbean Sea. It is the capital and chief seaport of the Crown Colony of British Honduras, which is about the size of the State of Massachusetts.

Photograph by V. M. Lizárraga

AT THE NEWTON CLUB, IN BELIZE

A public holiday was declared in honor of the visit of the American aviator, and on his way from the golf club (see page 553) to Government House the streets of the city were lined with cheering throngs, practically the entire population of 13,000. The governor of the colony stands at the

Photograph by G. M. Sprattey

SAN MIGUEL CATHEDRAL AT TEGUCIGALPA

In the days of Spanish rule in Central America, it was every archbishop's ambition to build a cathedral. This burnt-brick edifice, partly Moorish in architecture, faces the plaza in Tegucigalpa and dates from 1782. Statues adorn its niches and the interior is embellished with old

IN SALVADOR, AS AROUND VESUVIUS, PEASANTS PUSH THEIR FIELDS FAR UP VOLCANIC SLOPES

As from the muzzle of some gigantic gun, red-hot rocks and deadly gas once belched from this huge hole. Then it quieted; the years cooled it. Slowly, through the centuries, forests crept up its scorched slopes. Then man, forgetting the lessons of ancient eruptions, followed the climbing tree-line, clearing his fields, building his winding road, like a bit of white string, even along the crater's rim.

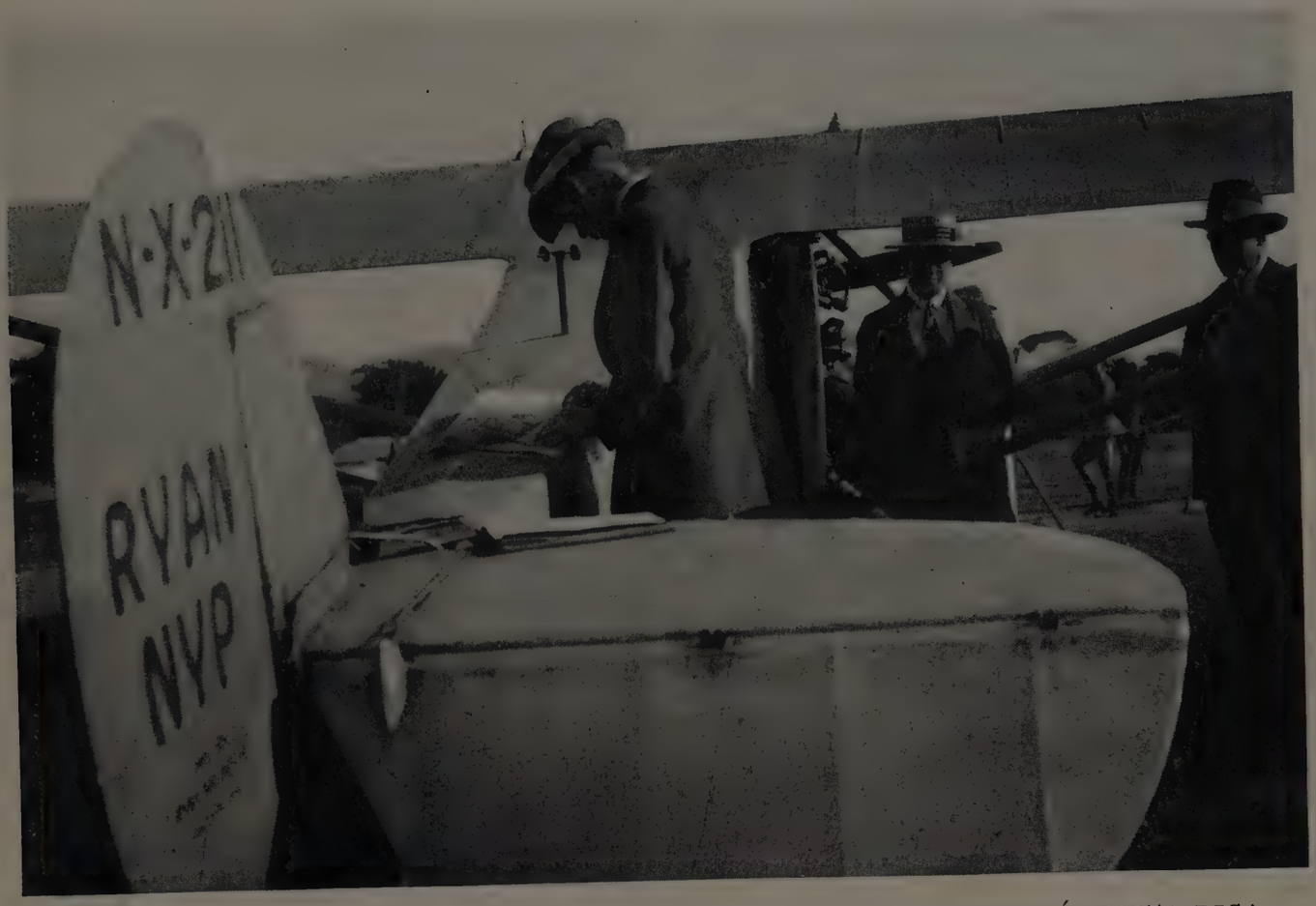
Photograph by G. M. Sprattey

THE "CASA PRESIDENCIA," OR WHITE HOUSE OF HONDURAS, AT TEGUCIGALPA

Photograph by Frederick Krug

LODGING FOR MAN AND BEAST ON THE CROSS-COUNTRY TRAIL

There are no hotels off the beaten track in Honduras, so the traveler must spend the night in a native house. He is welcome to the best the family affords, but usually prefers to sling his own hammock rather than occupy the bed of stretched bull hide or canvas.




HAVING A LOOK AT HIS MAPS BEFORE TAKING OFF FROM SAN JOSÉ, COSTA RICA

Photographs by Gómez Miralles

PAINTING HIS COUNTRY'S FLAG ON THE "SPIRIT OF ST. LOUIS"

In accordance with the precedent established in France, Belgium, and England after the transatlantic flight of last spring, the fuselage of Colonel Lindbergh's airplane was appropriately decorated with the ensign of each of the Latin American countries which he visited.

MOMOTOMBO VOLCANO, A FIERY CARBUNCLE ON THE FACE OF MOTHER EARTH

In the upper right a plane is approaching Nicaragua's most famous volcano. In Central America these smoking landmarks are useful guides to aviators. Till planes were built, men could not see volcanoes whole.

the clouds and either fly back to clear weather or hold my course by instrument until reaching the mountains, which would probably be clear. In fact, I did not regret the low flying, for thus I obtained a good view of the jungle, including the palmetto, mango, and other types of tropical growth.

I was so close to the ground I could see orchids and air plants hanging in the trees. Then there were birds—scores of varieties of many and various colors. Some were bright green and very small. Bigger ones flew in flocks and I could distinctly see their bright plumage. The most striking of all were those of a brilliant red, yellow, and blue. They had red heads and breasts, with yellow rings on the front of their blue wings, and red tail feathers that streamed out a foot or two behind. Still others were large and black, with a white spot on their backs.

Any forced landing here would have been exceptionally dangerous—first, because at such a low altitude it would be practically impossible to choose a place to crash in; second, because the entire territory is a dense swamp of the type which would make progress on foot impossible.

At one place I passed a native dugout drawn up on the river bank; near a small banana plantation close to another river

AN AIR VIEW OF CORINTO, THROUGH WHICH MOST OF NICARAGUA'S TRADE PASSES

Standing on a breeze-cooled island at the mouth of Realejo Bay, on the Pacific coast, Corinto boasts the best harbor in the republic.

CENTRAL AMERICA BRISTLES WITH VOLCANOES, DEAD AND ALIVE

This is the crater of Coseguina, in Nicaragua, whose eruption in 1835 was one of the most terrible in history. In Belize, more than 300 miles away, troops were mustered, the rumbling of the distant volcano being mistaken for a naval action off the harbor.

AN EASY LESSON IN GEOGRAPHY, FROM THE AIR

Working on the ground, climbing hills and wading streams, it would take an engineer days to draw such a map; but, photographed from a passing plane, this comprehensive picture of a town on the Coco River, in Nicaragua, was but a few minutes' work.

I saw a small hut; but at no time, flying over this swamp, did I see a human being. After passing the second river I varied my course to the south.

### IN COSTA RICA, ONE OF LATIN AMERICA'S MOST PROSPEROUS REPUBLICS

Now the country was getting higher. Small cultivated fields appeared and ahead were the mountains. I found a hole in the clouds and spiraled up to 7,000 feet. Crossing the mountains, I dropped down into a valley and found myself over the town of Alajuela. Fifteen miles away was the city of San José. There was such a crowd on the field that I dropped a note requesting that the people be moved back.

As I crossed the field, flying low, I could see the band in uniform playing on their instruments and the people waving their hats and flags. But the crowd was so bent on sticking close to the edge of the field that the police had to draw their sabers to hold them when I finally landed, after circling for twenty minutes.

There were many Americans living in the beautiful city of San José. Costa Rica is one of the most prosperous republics in Latin America.

I found both natives and foreigners keenly interested in flying. Air commerce must become an important factor in their progress. My own flights, so far, indicate that aviation is peculiarly adapted to transport in Central America. Here railroads and highways are still so scarce that a trip which now takes days or weeks by land could be made in a few hours by plane.

In 1914 I had seen Panama, traveling many days by steamer from New York. I wanted to see it again. As I flew, I could not help but reflect how much of

DENSE CROWDS SWEEP OVER THE LANDING FIELD NEAR SAN JOSÉ

For greater safety to the populace and to his plane, Colonel Lindbergh dropped a note written on a chart, asking that the spectators be moved farther back. When the plane landed he cut the switches to stop the propeller, so that the enthusiastic citizens who rushed toward him might not be injured.

Photographs by Gómez Miralles

CITY AND COUNTRY CHEER THE FLYER FROM THE NORTH

Taking advantage of free train rides to the capital furnished by the Government on this occasion, Costa Ricans flocked from all parts of the countryside to the landing field at San José and took up their positions early on the morning of Colonel Lindbergh's arrival. The field, ordinarily a pasture ground and golf course (see page 562), had been smoothed and leveled.

Photograph by Gómez Miralles

"VIVA LINDBERGH!"

Surrounded by shouting thousands, the flyer's automobile moved slowly through the streets of San José to the American Legation, past welcome signs and bunting-bedecked buildings, and in a shower of confetti and spirals of roses from roofs and balconies.

Photograph by Gilbert Grosvenor

COSTA RICA'S CAPITAL IS SURROUNDED BY ACTIVE AND DEAD VOLCANOES

Due to its high elevation, much of Costa Rica enjoys a temperate climate. Its name, in Spanish, means "Rich Coast." While coffee and bananas are the republic's chief exports, dense forests of hardwoods are found on its Atlantic seaboard. Sugar, cacao, vanilla, sarsaparilla, rice, and cotton are also grown.

LAUGHING SCHOOLBOYS OF COSTA RICA

For more than 40 years education has been free and compulsory in this progressive republic. The result is observed in the people's standards of living. Education has brought not only a long period of peace, but able rulers, honest courts, sound land titles, and well-conducted public utilities.

Photographs by Gilbert Grosvenor

A BULLOCK TEAM ON THE STREETS OF SAN JOSÉ

More than a tenth of the population of Costa Rica resides in the capital city of San José, many of whose streets are macadamized and well lighted with electricity. With an excellent water supply and a temperate climate (being situated on a plateau 3,868 feet above sea level), it is one of the most attractive of Central American cities.

Photograph by Publishers' Photo Service

COFFEE GROWING IS COSTA RICA'S CHIEF INDUSTRY

After the berries are picked they are taken to the mill to be depulped, fermented, and washed. Then they are spread out on a cement floor to be dried and turned in the sun for a week. A yield of one pound per tree is considered good, though this is often exceeded. The Costa Rican industry is

THE "SPIRIT OF ST. LOUIS" FLYING OVER FORT SAN LORENZO, IN THE CANAL ZONE

Once considered impregnable, this old Spanish fortification at the mouth of the Chagres yielded to the assaults of Sir Henry Morgan, the wily buccaneer, in the 17th century. After being rebuilt, it was bombarded by Admiral Vernon (after whom George Washington's brother named Mount Vernon—see Color Plate III) in 1740. During the gold rush to California it served both as fort and customhouse.

Photograph by Lewis Photo Service

PANAMA PHOTOGRAPHERS IN ACTION AT CAMPO LINDBERGH, PANAMA (SEE, ALSO, PAGE 568)

This flying field, on the outskirts of Panama City and outside the limits of the Canal Zone, was prepared especially for the American flyer and named in his honor.

time and distance have been wiped out by science and invention. Though on this flight I had covered over 4,000 miles since leaving Washington, my actual flying time had been about two days.

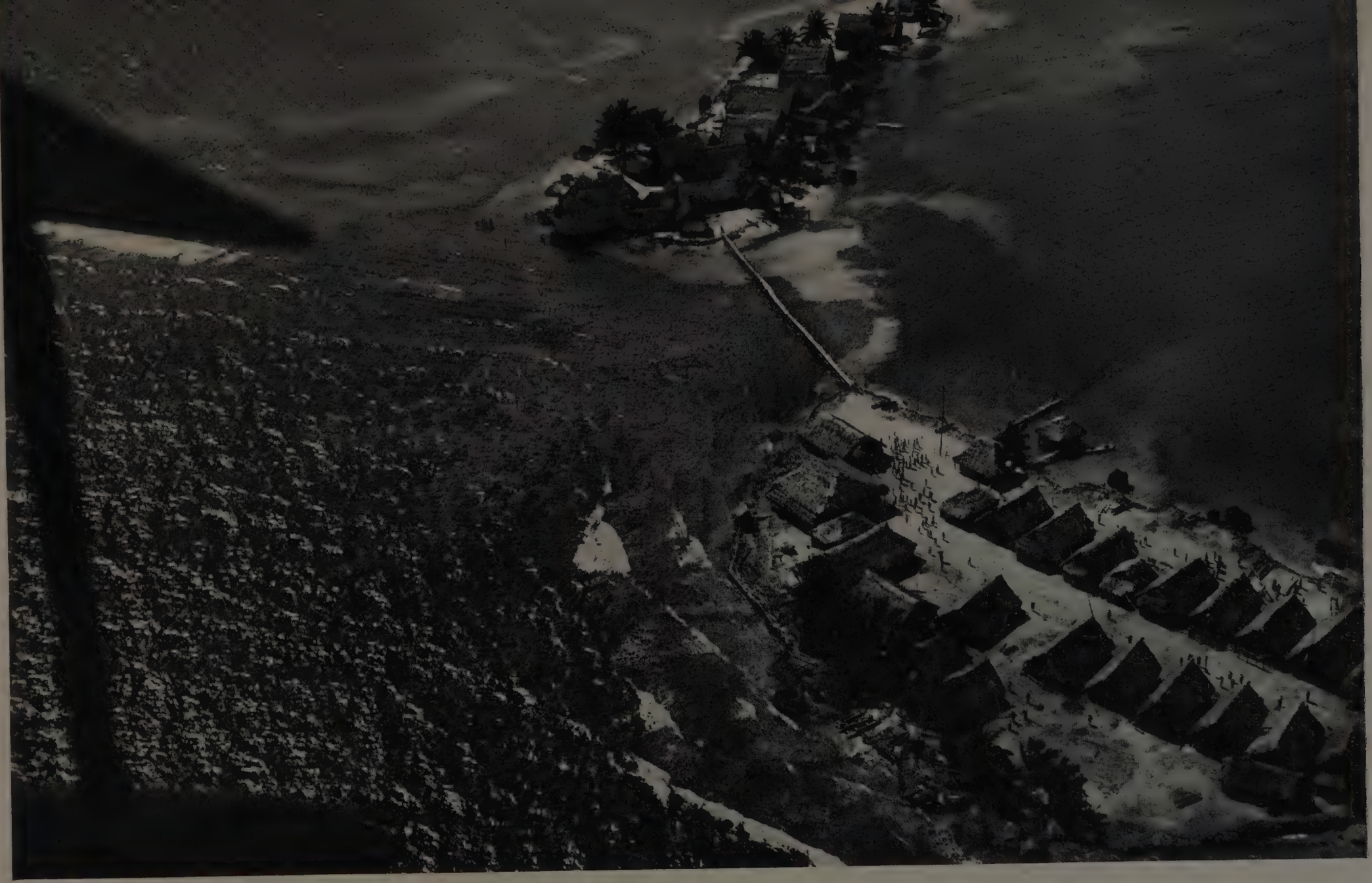
The country from San José to Panama is broken and wild, but there were several places where planes might land. I followed the valley of the Reventazón River and came to Almirante; then across Chiriquí Lagoon and Bocas del Toro. Striking the Atlantic coast at Mosquito Gulf, I followed the shore a few miles before striking across country toward Panama. Now huts and small plantations became more numerous. I passed between Gatun Lake and Chorrera. Off in the Bay of Panama I could see Taboga Island. Soon many of our Army and Navy planes came out to meet me from their base on the zone.

In the future, flights through Central America, like the one that brought me here, will make travel by air a common means of transport.

### AIRPLANES AND AMERICAN HOSPITALS A BOON TO THE ILL AND INJURED

I was astonished during my visit here to find how many Panamanians speak English. Interesting as my trip through these countries has been, it would have been much more so had I known Spanish. I never realized before what a barrier the lack of a common language is to a mutual understanding between peoples. The people of the United States could afford to study more Spanish.

One of the greatest accomplishments Americans have made down here is in hospital work. Patients now come from all parts of Latin America for treatment in American hospitals on the Zone.



SAN BLAS INDIANS LIVE ON TINY ISLES LYING OFF THE ATLANTIC COAST OF PANAMA

Though smaller than a city block, some of these palm-fringed islets are literally crowded with the nipa shacks of Indians. From the air they seem to rise hardly high enough to escape inundation by the breakers, especially in rough weather. Fishing is the San Blas Indian's chief occupation. He also makes his own turtle spears and markets his turtle shell, or "plates," with foreign traders in Panama.

Photograph by Acme

THE FLYING AMBASSADOR ARRIVES IN PANAMA

History reveals here, on this Isthmus, one of those strategic world map-spots—like the valleys of the Rhine and the Tigris—where important things are always happening. Long, long ago, over this land bridge, a great civilization marched from Mexico to Peru. Pirates, in the days of discovery, used Panama as a base. Adventure and sublime achievement it has known, from Balboa to Goethals. What with pre-Aztec migrations, gold hunters from Pizarro to California forty-niners, French and American ditch-diggers, and now the rising tide of world tourist trade through its Canal, cosmoplastic Panama has played a singular rôle in Western civilization. . . . Lindbergh lands at Panama City.

Army aviators from France Field have brought sick and injured people to the hospital, in emergency cases, from remote parts of the interior by plane. Ambulance planes, amphibians, and bombers have been used for this work. Often these flyers carry nurses with the patient in the airplane, and sometimes a mother with her children.

When I last saw Panama, the great Culebra Cut was filled with steam shovels and dirt trains. They were carrying out the last excavated earth before breaking the dike that was to fill the Canal with water from the Río Chagres. Consequently it was interesting to fly over now and see this "Big Ditch," where last year more than 6,000 commercial vessels passed from one ocean to another. As I looked down on the boats using the Canal, and on the many little green islands in the artificial lake—islands that were once the tops of hills—I could not help thinking how much an air-mail service would bene-

PROSPEROUS PANAMA CITY, NEAR THE PACIFIC END OF THE CANAL

Every newcomer gets the points of the compass twisted in Panama. The sun appears to rise in the wrong place. Balboa, misled because the Isthmus runs east and west, named the Pacific the Great South Sea. Panama City itself, though on the Pacific coast, is south and east of Colón, the Atlantic entrance of the Canal.

fit this great volume of shipping. Any speeding up of communications is of help to the transport business.

### GEOGRAPHIC PARADOXES AT PANAMA ARE SIMPLIFIED BY AN AIR VIEW

After resting and hunting a few days, I took off from France Field and laid a course for Cartagena, in Colombia. Several planes from France Field, at Colón, escorted me on the first part of my journey.

We commonly think of the Atlantic as being east of the Americas and the Pacific as being west, but because of the kinks in the narrow Isthmus and the directions in which it twists, one may get the impression that the sun rises in the west and sinks in the east. When you get up in the air, however, and look down on the map of the Isthmus and the Canal, and on the two oceans at once—if the day happens to be clear—then the geographic paradox is plain enough.

AN AËRIAL VIEW OF PORTO BELLO, BURIAL PLACE OF SIR FRANCIS DRAKE

The name of Drake, son of a clergyman, lives in the lore of Panama as one of the boldest sea kings of all time. When seas yielded no prize he led his crews ashore. From one Panama mule train tradition says he took thirty tons of gold and silver. His amazing success as a freebooter led Queen Elizabeth to grant him letters of marque to prey on Spanish ships. He sailed around the world, winning knighthood for the achievement, and in 1596 died aboard ship and was buried at sea, a league offshore from Porto Bello, which is only 20 miles from Colón.

For the first few miles I flew over thick jungle; then the Pacific coast appeared, and I passed over open savannas. The coast here was only a few miles off my plotted course, and I deviated enough to follow it for a short distance. The Pacific tide is very high along the Panama coast, and at low tide a broad belt of mud flats appears between the high- and low-water mark.

Pelicans and other water birds by the thousands covered these mud flats. Now and then a grass hut appeared on the shore line. There were numerous dugouts and small sailboats, some of the latter often several miles out at sea.

Flying low over jungle streams, I saw dozens of alligators sunning themselves on the mud banks.

### FROM THE AIR A JUNGLE RESEMBLES A VAST GREEN SPONGE

Far to the southeast of Panama City I left the coast and headed over the interior toward Cartagena, on the Atlantic side. This country was wild and almost uninhabited.

Before sighting the Caribbean Sea I

HERE MORGAN, THE BUCCANEER, DESTROYED THE OLD CITY OF PANAMA

The daring freebooter and his band sacked and burned Panama City in January, 1671. It took 175 pack animals, wrote Esquemeling, to carry the gold, silver, and other loot. To-day an excellent motor highway follows the path where once Spanish pack mules floundered through mud and weeds.

flew over a cloud-covered range of mountains—often within a few hundred feet of the peaks and the mountain sides.

Down here, near the Equator, mountains are quite different from those in the United States. Usually even the highest here are completely covered with heavy dark-green growth. Now and then a miniature river appears from nowhere, dashes out over a precipice to fall in a curtain of mist, to disappear again in the jungle several hundred feet below. It is easy to fly over a jungle river without seeing it. High trees grow by the banks and branch out over the water until their boughs interlock over midstream a hundred feet above the water.

Orchids and air plants, together with numerous vines, hanging down like ropes from the tree tops, help to cover the ground and water below. Flying over very dense jungle, you seldom see the ground at all—nothing but a solid green mat of tree tops that look from above like a vast green sponge or an endless field of velvety moss.

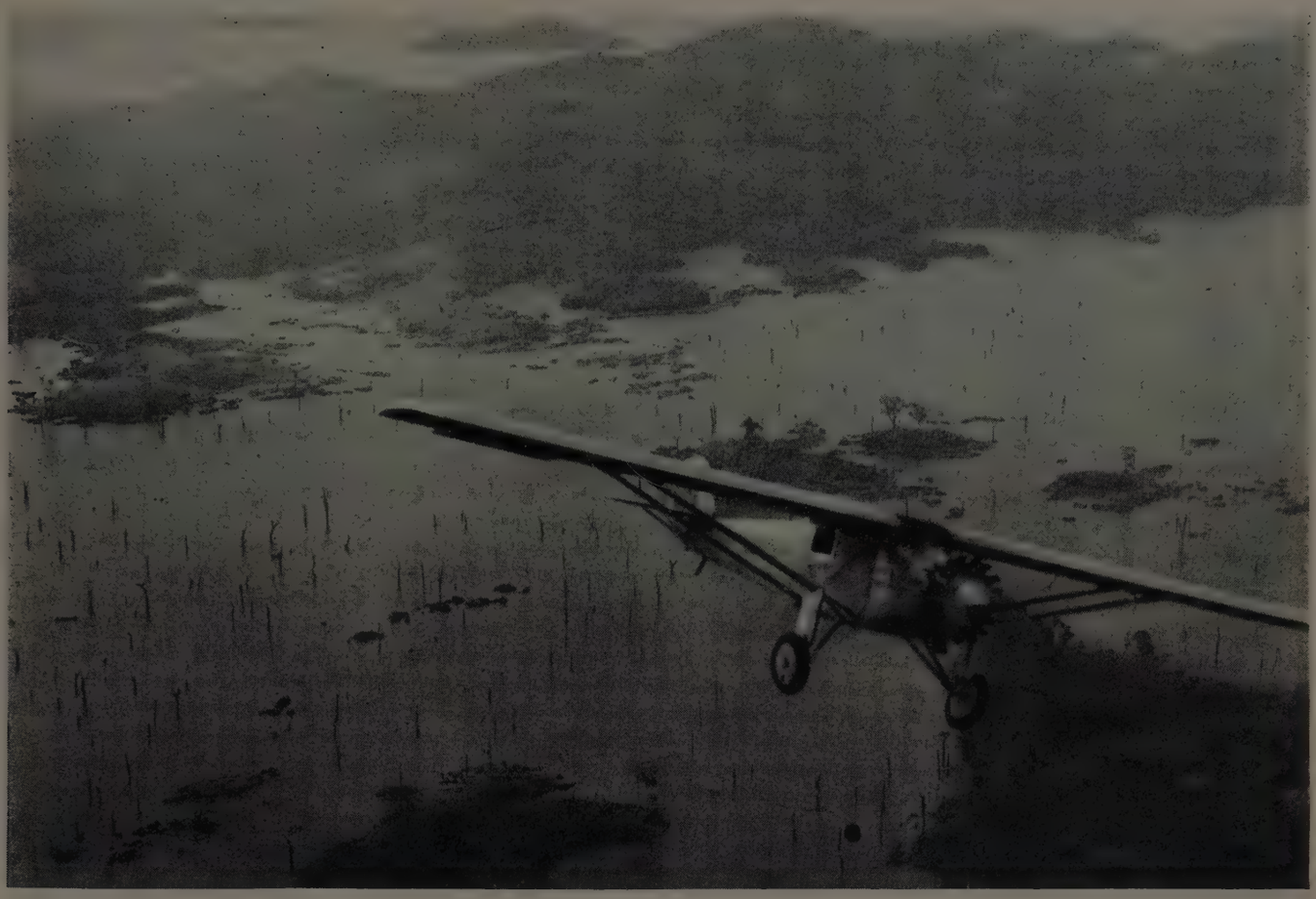
I found the Caribbean coast rugged and dotted with small isles. Flying over the north end of Urabá Gulf, I set a compass course across the thirty miles of salt water

THE AMERICAN AVIATOR, PILOTING HIS "SPIRIT OF ST. LOUIS," FLIES OVER A SHIP PASSING THROUGH THE PANAMA CANAL

Photograph by Pacific and Atlantic

THE "LONE EAGLE" NEARS COLÓN, PANAMA

Seventy-odd years ago a swampy islet of mud and jungle became a town to serve as an Atlantic terminus for the Panama Railway. Now it is a modern city worthy of being an Isthmus gateway, for gone are the days when it was a tropical death trap and laborers had to live on ships to escape the unbearable horrors of the swamp.



THE SINGLE-SEATER WINGS ITS WAY OVER GATUN LAKE: PANAMA CANAL ZONE

On his flight to Colón, Colonel Lindbergh made an aërial inspection of this artificial lake, which was created by the closing of Gatun Dam across the Chagres River and the subsequent overflow of 165 miles of lowland. The lake is dotted with the tops of trees killed by the overflow and with green islands which were once the summits of high hills. One of these islands, Barro Colorado, has been set aside by the United States Government as a sanctuary for the conservation and study of tropical life (see "Who Treads Our Trails?" in the NATIONAL GEOGRAPHIC MAGAZINE for September, 1927).

to the Colombian shore. I wrote my notes in the air, on the margin of my map.

Some 1,800 feet up I cruised along the coast of the Gulf of Darien. Below appeared many small villages, along the shore. Inland the country was hilly, but not mountainous. In fact, from here I could see no mountains at all, perhaps because haze cut visibility to about 40 miles. Along the gulf coast I made about 95 miles an hour, against a head wind, and reached Cartagena at 1:45, on January 26.

### FIVE HOURS FROM CARTAGENA TO BOGOTÁ

On the 27th I left for Bogotá, which lies almost due south of Cartagena, in the interior of Colombia. It used to be considered one of the most inaccessible Latin American cities. Now its people get in and out by air, in a mere fraction of the time required by other means. It took me a little over five hours to fly there from Cartagena.

For the first hundred miles the country I flew over was inhabited and contained many places where I could have landed had it been necessary, but after leaving the San Jorge River I struck a rugged country, covered with very dense jungle. The color of the trees here was different from any I had seen. Some bore red flowers and stood out sharply in contrast with the dark green of the jungle. Here and there was one of a brilliant yellow color.

About a third of the way to Bogotá I located myself above the forks of the Nechi and Cauca rivers. Soon after noon I passed over Puerto Berrío. From 2,000 feet up I looked down on many people in the streets. There were river steamers in sight, and at the river bank there was one of the airplanes used by the German company that runs a commercial service from Bogotá down the Magdalena River.

I was flying at about 8,000 feet and was

ALONG THE LONELY HIGHWAYS OF THE SKY: OVER CHEPO, PANAMA

As the careening caravels of Columbus dared uncharted seas, so this silver-winged sky-schooner, with a lone man aboard, droned through empty cloud worlds—from the Potomac to the Magdalena.

Photograph by Foto-Cartagena

THE "SPIRIT OF ST. LOUIS" REACHES COLOMBIA

Excited spectators, running pell-mell onto the landing fields, constantly caused deep anxiety to the aviator. Colonel Lindbergh landed at Cartagena 15 minutes ahead of schedule after his long flight over jungle, mountain, and sea from Panama (see text, page 573).

Photograph by Foto-Cartagena

THE CHIEF GATE TO CARTAGENA, FOUR CENTURIES OLD

Bold Spaniards, in quest of treasure, landed and built fortified towns like Cartagena, in Central and northern South America, nearly a century before English colonists settled in Virginia and Massachusetts. The products of Hollywood and Detroit are much in evidence here.

Photograph by W. Robert Moore

THE WATERFRONT AT CARTAGENA, COLOMBIA

Judging by its strategic place on the map, this ancient city of stone walls, forts, and forgotten dungeons, once Spain's great stronghold in the Western World, may assume new importance when air lines run from North to South America along the Caribbean littoral.

Photograph by Wilson Popenoe

THE WATERFRONT AT GIRARDOT, INLAND RIVER PORT FOR BOGOTÁ

The Magdalena, flowing almost due north, is navigable for hundreds of miles through the Republic of Colombia. Going to Bogotá by the side-wheel steamers that ply this long, winding stream, one starts from Barranquilla, on the Caribbean coast. Over this route a regular sea-plane service now passes, making the trip in a few hours (see page 577).

© Scadta

AN AIR VIEW OF THE JUNGLES OF THE UPPER TARRA RIVER: COLOMBIA

Like the winding trails of legendary dragons, jungle rivers twist among endless tropical swamps, often affording the only easy means of travel through the vine-bound undergrowth. A man wading along the margins of such a jungle river, or navigating it by canoe, knows from its curves that it is crooked, but only the aviator can really grasp its league-long loops.

Photograph by Wilson Popenoe

A MARKET IN BOGOTÁ, SOUTHERNMOST CITY REACHED BY THE AMERICAN FLYER

Although planes have rescued it from age-old isolation, Bogotá's working habits are little affected. As in early days, life is still most active around the markets. Each section handles its own class of products. In the foreground are the plantain venders selling a banana that must be baked or boiled; beyond are mats, baskets, and bird cages made of reeds.

© Scadta

LONG-DISTANCE AIR LINES PAY WHEN NO RAILWAYS COMPETE

From Barranquilla to Bogotá, along the Magdalena River, in Colombia, Germans operate an air commerce line. Before these planes came, Bogotá people often took many days to reach the sea by river steamer (see text, pages 573 and 578). These are the hangars of the Magdalena air line at Barranquilla.

Photograph by George M. Dyott

A YOUNG PECCARY BECOMES A PET

While flying over the extensive grassy plains of Colombia and Venezuela, Colonel Lindbergh observed what he at first thought to be herds of pigs, but which proved to be peccaries, New World relatives of the swine. They are found throughout Mexico, Central and South America, and as far south as Patagonia.

some 60 miles from Bogotá when I found clouds covering the mountains. I had to detour to find an opening, and finally got through the mountains at 9,800 feet.

The Bogotá airport is out at Madrid Field. I passed over it about 2 o'clock, but went on and circled around the city of Bogotá several times, and then came back before landing at Madrid Field at 3 o'clock.

Considering its size and isolation, Bogotá is far more air-minded than many larger cities in America. I understand German commercial planes that serve Bogotá are sometimes booked up weeks ahead. The people with money to fly gladly forsake tedious travel by mule, motor, and river boat for the quick, comfortable voyage by air.

It is 665 miles on an air line from Bogotá to Caracas. The sky was clear when I took off, at 6:48 a. m., on January 29, and headed straight for Caracas.

### FLYING 50 FEET OVER THE FAMOUS LLANOS

By the end of the second hour it had become quite cloudy. Finally I had to reverse my course. Though flying at 10,500 feet, I was unable to get over the mountains.

After spiraling for about twenty minutes, I crossed over the ridge between the clouds at 12,000 feet. At this point the mountainous country ended and I passed out over a clear, high region. Detouring once to avoid a local storm, I came finally over the open plains, or llanos, where I could have landed anywhere.

These great plains, about 1,000 feet above sea level, were covered, as far as I could see, with scattered cattle. I flew low, often only 50 feet from the ground. Besides the cattle, I saw near the lakes and streams what I first thought to be herds of pigs; yet they didn't look exactly like pigs; there was something peculiar about them. I circled and passed about 10 feet over one of the herds. Frightened, they dashed into the water and swam across. They turned out to be peccaries. Turning back on to my course, I passed

Photograph by Thomas F. Lee

WITH HIS STICK-PLOW AND BULLS, HE FARMS AMONG THE CLOUDS, ALMOST 10,000 FEET ABOVE THE SEA

Venezuela is a land of amazing latent wealth. From its rich oil fields and its mines to its vast agricultural valleys and stock-raising highlands, it is capable of great economic growth.

over two antelope. Thereafter, for 200 or 300 miles along my course, as far as I could see, antelope, peccaries, and cattle were scattered over the llanos.

Besides herds of peccaries and groups of a dozen or more antelope, there were birds, larger and different from others I had seen in the Tropics. Some were brilliant red; some of the larger ones were pinkish—probably flamingos.

### RACING WITH THE SUN FOR THE MARACAY FLYING FIELD

For 400 miles after leaving the mountains and striking this great open grassy plain, there were no landmarks by which I could check my position. Then mountains began to appear indistinctly on the horizon to my left—the Cordillera of Mérida.

Ahead loomed the cloud-covered lower mountains around Caracas, which I had to cross to get to the city. These clouds were so thick I could not get through. I followed around the south side of the range for over two hours, hunting an opening before I was able to reach the sea.

I located position as about 150 miles east of Caracas. It was then about 4 p. m. The sun was due to set at 6. There might be fog on the mountains surrounding the city; consequently it was necessary to make the best possible time. If I was not able to get through to the field at Maracay, there would be only a few minutes to hunt for an emergency field before sunset.

With a wide-open throttle I flew the distance in order to arrive before dark. As I neared Caracas the coast grew rougher and the sand beach disappeared. The railroad from La Guaira to Caracas was covered with fog. I kept on along the coast for several miles, then backtracked to Caracas through an open valley and landed at Maracay a few minutes before sunset.

The greater part of my route from Bogotá to Caracas was over country where air lines might easily operate, with plenty of excellent places for planes to land.

Photograph by Thomas F. Lee

A SECTION OF THE MARKET PLACE IN CARACAS

The steps at the right are covered with long strings of garlic, bundles of onions, and other vegetables. The mules and burros patiently await the sale of the burden that they carried in to market in the early morning, so that they may carry their masters back to their little mountain *fincas* in the evening.

From the landing field I drove by motor over a good cement road to Caracas. The road wound about the mountains for some 70 miles. The actual distance between the two cities is hardly more than half of that.

This was my last stop on the mainland of South America. No people could have treated a stranger more handsomely. From Mexico City to Caracas I met with nothing but kindness, boundless hospitality, and enthusiastic public interest in my flight.

At Caracas I had the honor of laying a wreath on the tomb of that great liberator, Simón Bolívar, in the National Pantheon.

## GOOD-BYE TO SOUTH AMERICA

It was 6 o'clock on the last day of January, 1928, when I took the air from Caracas and said good-bye to the South American Continent. Before me stretched my thousand-mile flight—a big half-circle swing over the Lesser Antilles to St. Thomas, in the Virgin group. To get there before dark, I had to fly at high cruising speed, since a head wind was blowing.

Over Cape Tres Puntas I took up a compass course for the island of Grenada. In ten minutes the coast of South America disappeared from view in the haze. I flew over three small sailboats and then ran into a rain squall. In about an hour Grenada appeared indistinctly on the sky line. Thereafter, for 400 miles, an island of some kind was always in sight (p. 582).

On almost every island which had any vegetation, there were signs of human life. Some of them were thickly populated.

From Saba Island I steered straight across 120 miles of water for St. Thomas. Altering my course a bit when I saw a big steamer, I glided low down directly over her. She was the *Amsterdam*. Thirty miles away the Virgin Islands lifted their green heads from the blue water, and I landed at St. Thomas. It was then 4:50 p. m., 60th meridian time, which is 30 minutes ahead of Maracay time. I had made the flight in ten hours and fifteen minutes.

It's only 80 miles from St. Thomas to San Juan, Porto Rico; but, at the request of the Governor of the Virgin Islands, I flew over St. Croix on the way to Porto Rico. It was 11:45 in the morning when I left St. Thomas and passed over two small islands in the West Indies on my way to the town of Christiansted, on the Island of St. Croix. This hop took only thirty minutes. Travel between these small islands by boat is often slow, uncomfortable, and at times uncertain; yet by air they are only a few minutes apart.

Around the islands the water is so clear that I could see many fathoms down into it, when flying low. There were numerous reefs in some places, while only a short distance away, according to my chart, the depth increased to hundreds of fathoms. Between the islands there were many fishing boats. The West Indies offer some of the best fishing in the world.

Photograph by Wide World

AMONG ALL GREAT NAMES IN SOUTH AMERICAN HISTORY, NONE IS ABOVE THAT OF SIMÓN BOLÍVAR

With officials of the Venezuelan Government, the American flyer visited the beautiful tomb of the Liberator, which stands in the National Pantheon at Caracas. Upon it he placed a wreath with a ribbon bearing the legend, "From Colonel Charles Lindbergh to the memory of General Simón Bolívar."

After circling Christiansted I flew over the middle of St. Croix Island to Frederiksted; thence to the Island of Vieques and over Porto Rico to San Juan, landing shortly before 2 o'clock in the afternoon.

My flight over these islands impressed me with the facility with which an air line could be established connecting North and South America. They are so close together that on a fairly clear day one of them is always visible from another, even from low altitude. The longest water gap would be only a little over 100 miles. In fact, I believe that even short routes between the islands themselves might be profitable.

### ADVANTAGES OF AIR LINES IN THE WEST INDIES

In the United States our air lines must, of course, compete with highly developed rail transport. When a plane loses a few hours, due to fog, the railroad is superior. But down in the West Indies conditions are different. Even if a plane lost a day or two, it would still have an advantage over ground and water travel. I believe

Photograph by A. Muller-Marty

TAKING FUEL AT MARACAY, VENEZUELA, FOR THE SEA HOP TO THE VIRGIN ISLES

Embarking on his longest flight since he landed at Mexico City, Colonel Lindbergh took on a heavy load of gasoline. He made an early-morning start, for he anticipated a struggle with head winds, and was anxious to cover the more than 1,000 miles to St. Thomas in 12 hours and land before darkness set in.

Photograph by Gilbert Grosvenor

PEAKS OF ST. KITTS SNATCH A SHOWER FROM THE MORNING CLOUDS

This British West Indian garden spot is also called St. Christopher Island. Columbus found it in 1493 and named it after his patron saint. Rising 4,000 feet above the warm, blue seas, it makes sugar, molasses, and rum, and easily supports 36,000 people in comfort. Basseterre, with 8,000 inhabitants, is its capital.

Photograph by Gilbert Grosvenor

SABA LIES ON THE AIR ROUTE FROM VENEZUELA TO THE VIRGIN ISLANDS

This volcanic cone, owned by The Netherlands, has an area of about five square miles. Of the island's 1,600 inhabitants many are retired Dutch seagoing men, who chose this retreat for its singularly salubrious climate. No wheeled vehicles are known here (see, also, illustration below).

Photograph by Ewing Galloway

THIS TOWN LIES IN AN EXTINCT VOLCANIC CRATER

Saba Island rises to a height of nearly 3,000 feet. Its only settlement occupies the bottom of the crater and is appropriately named "Bottom." The Dutch-descended, but English-speaking, inhabitants build small boats and fishing craft which are famous in interisland trade and which must be lowered over the cliffs to a harborless shore. They also till upland fields.

Photograph by West Indian Aërial Express

TIRED AFTER A 1,050-MILE FLIGHT OVER WATER

Quitting the South American mainland at Maracay, near Caracas, Lindbergh took a crescent-shaped course over the Lesser Antilles, which, with Porto Rico, Haiti, and Cuba, form a semicircular land bridge between the Americas. Keeping to the west of Trinidad and Barbados, the flyer steered by compass, first for the island of Grenada; then, swinging more to the north, he passed St. Vincent, in the British Windward Group; thence north, over St. Lucia and past Martinique, girlhood home of the Empress Josephine and scene of the historic Pelée volcanic disaster of 1902. On this lap islands were always in sight—including Dominica, Guadeloupe, Montserrat, St. Kitts, and Saba—till the flyer finally landed on the golf grounds at St. Thomas, in the American-owned part of the Virgin group.

that the West Indian Islands and Central and South America offer wonderful opportunities for the establishment of regular air transportation.

Flying from Porto Rico to Santo Domingo required but little attention to navigation. There were many distinct landmarks. In addition, a tail wind was blowing, which kept me ahead of schedule, even with throttled engine. Low over the Porto Rican coast I passed a school of sharks; then a big sea turtle floating on top of the water, which dived as the plane approached.

Flying a modern plane under favorable conditions and off the beaten air lines requires very little attention beyond navigating and occasionally checking over the instruments. These record accurately the condition and performance of both ship and engine.

Without difficulty I wrote my newspaper dispatches on the back of a hydrographic chart while passing over the east end of Haiti. Sixteen hundred feet below was the jungle. A few miles ahead were clearings and farmhouses, and farther on a small city, standing out white and distinct against the green background of tropical mountains. Cumulus clouds, floating above, mottled the earth below me with a pattern of broken shadows.

### FROM SUMMER TO SPRING IN A FEW MINUTES

I was still far ahead of my schedule. To keep from arriving too early, I made a trip to the cloud layer above. Cumulus clouds usually have many openings between them, so blind flying is necessary only for short intervals. At 7,200 feet I found myself inside of a cloud. Water

THE CAPITAL OF THE VIRGIN ISLANDS FROM THE AIR

This old city is situated on a fine harbor at the foot of tree-clad hills. Lacking wells or springs, it gets drinking water by catching rains that fall on artificial brick watersheds, one of which appears as a white spot above the center of the picture. The United States bought the Virgin Islands from Denmark and the street names are Danish, but the people prefer English. A street sign once read: "Cool sherbet and other such sippings."

Photographs by West Indian Aërial Express

UNDER AMERICAN RULE CHARLOTTE AMALIE HAS CHANGED ITS NAME

Even on gala days, as when the American flyer arrived, the chief city of the Virgin Islands, now called St. Thomas, is peaceful and orderly; but time was when Blackbeard is said to have made this his haunt, and while corsairs, pirates, and the sea hawks of Europe kept the whole Caribbean in an uproar, no man's life was safe.

Photograph by West Indian Aërial Express

CULEBRA ISLE, ON THE AIR ROUTE FROM ST. THOMAS TO PORTO RICO

© Elmendorf from Galloway

BARRELS OF MOLASSES ON THE BEACH AT ST. CROIX

Certain economic problems, severe at the time, arose for the natives when Denmark sold the Virgin Islands to the United States. A local Danish bank, for example, had a charter granting it the right to issue paper money; but when title to the islands passed, American money became legal tender and led to confusion. Lindbergh flew over St. Croix en route to Porto Rico (see text, page 581).

Photograph by West Indian Aërial Express

IF YOU WANT IT WELL DONE, DO IT YOURSELF!

Like Robinson Crusoe, the Lone Flyer survived because he left nothing to chance. He inspects his motor at St. Thomas, Virgin Islands, before starting for Porto Rico. At the extreme left is Governor Waldo Evans.

streamed off my wings and struts. Four hundred feet higher I climbed out of the cloud, above its billowy top layer. Here the sky was clear.

In just fourteen minutes I had changed from the warm air close to the ground to a fine, cool climate nearly 8,000 feet up, where I had to turn on the intake heater to keep up the engine temperature. One of the finest things about flying is that in a few hours you can get from one climate to another; or that in a few minutes of climbing or descending you can often find the temperature you want. I went on up to 9,700 feet. Santo Domingo was only a few minutes away.

"We are the oldest city in the New World," they told me in Santo Domingo. Work on the cathedral here was begun in 1514; it is the oldest in this hemisphere. It holds the tomb of Columbus; I was shown his casket. His family had a chapel here. Santo Domingo itself, it is recorded, was founded in 1496 by Bartholomew Columbus, brother of Christopher.

Circling above Santo Domingo, as I took off for Port au Prince, I could not help but think how times have changed. What a difference there is between the modern airplane and the *Pinta, Niña,* and *Santa María.*

## FLYING OVER TWO REPUBLICS ON THE ISLAND OF HAITI

It was February 6 when I flew over that green island which holds the two republics of Haiti and Santo Domingo.

After leaving the tropical plain near the city of Santo Domingo and passing over low mountains, I climbed up over a high, fertile plateau covered with vegetation. Here, in this more temperate clime, stands Santiago de los Caballeros, the largest city in the interior of the Dominican Republic. I flew low over the crowd gathered on its aviation field. Then off for Cape Haitien, passing the famous citadel of Christophe, and on over Saint Marc on my course for Port au Prince.

Much of the country I flew over was

Photograph by Frederick E. Cook

SKIMMING ABOVE THE SURF NEAR SAN JUAN

At 2 p. m. on February 21, 1928, the *Spirit of St. Louis* reached San Juan, Porto Rico, on its long swing back from Bogotá over the isles of

Photograph by Frederick E. Cook

PORTO RICAN SCHOOL CHILDREN GREET THE AMERICAN FLYER AT CAMPO DEL MORRO

In the background is the historic stone fort that guarded the entrance to San Juan harbor in Spanish colonial times (see, also, page 590). Since American occupation, in 1898, life in Porto Rico has greatly changed, through the conquest of disease, road building, and the rise of more public schools (see "Porto Rico, the Gate of Riches," by John Oliver La Gorce, in the NATIONAL GEOGRAPHIC MAGAZINE for December, 1924).

Photograph by R. Colorado

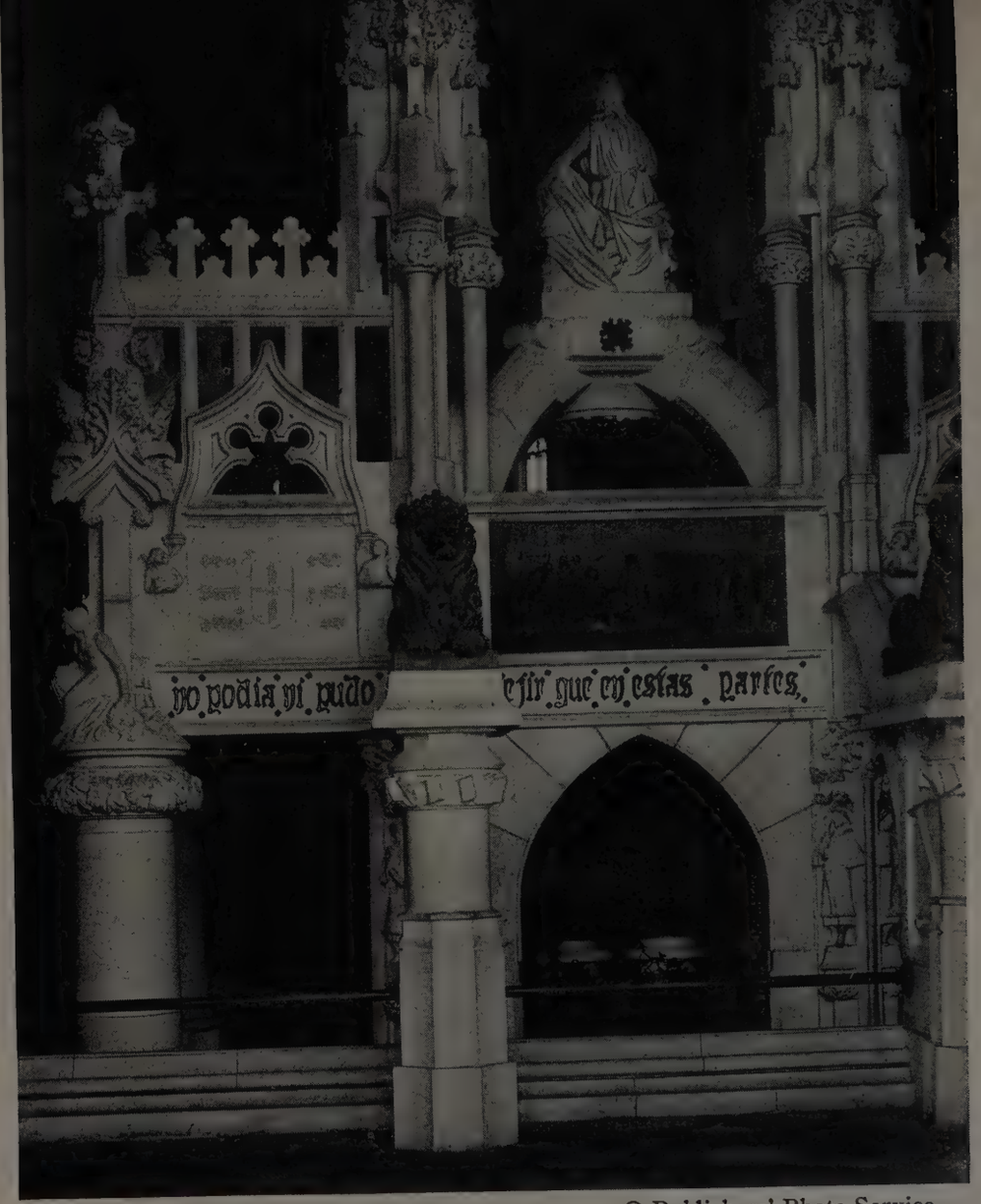
WHERE SPANISH MERCHANTMEN LAY SAFE UNDER SAN JUAN GUNS

On the outer end of the point stand the old Spanish coast-defense works (see, also, page 589). These early Spaniards were good engineers and excellent masons. Their old military road, built centuries ago across the mountainous island of Porto Rico, is a marvel of smooth rock paving and

Photograph by International

TRADITION SAYS COLUMBUS TIED HIS SHIPS TO THIS TREE

The "Columbus Tree," as the Dominicans know it, lived for centuries beside the roadstead which forms the port of Santo Domingo. In 1910 experts placed its age at 600 years. It died in 1918, but portions of the trunk still stand, braced by concrete. That not only Columbus, but Ojeda, Nicuesa, Enuciso, and later Diego Columbus, son of Christopher, all tied their ships to this convenient tree, is the belief of the Dominicans, who

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HERE THE ASHES OF COLUMBUS ARE BELIEVED TO REST

At his own request the great discoverer's remains were carried from Spain to Santo Domingo and interred in the cathedral. Spain subsequently decided to remove them to Havana, then to Seville; but later, in repairing the Santo Domingo Cathedral, a leaden casket was found marked "Cristóbal Colón, Primera Almirante." This inscription and other evidence point to an unsettled conclusion that Columbus still sleeps where he willed to

WAITING FOR THE "LINDY" SMILE

Young ladies of Santo Domingo, wearing "airplane hats" and "Lindy" neckties, aboard a float in the welcome fiesta to Colonel Lindbergh.

Photographs by R. Colorado

A NEW COLUMBUS—OF THE AIR—REDISCOVERS SANTO DOMINGO

As he winged his way over land and water, no welcome was warmer than that given the American flyer at Santo Domingo. Here models of the Eiffel Tower and the Goddess of Liberty were set up, emblematic of his New York-to-Paris flight.

A PATIENT DONKEY UNDER A BIG LOAD IN SANTO DOMINGO

Looking at such a burdened beast, one often wonders why he doesn't simply lie down or balk till some of the weight is taken off. But it is his nature to plod.

Photographs by David E. Wendt

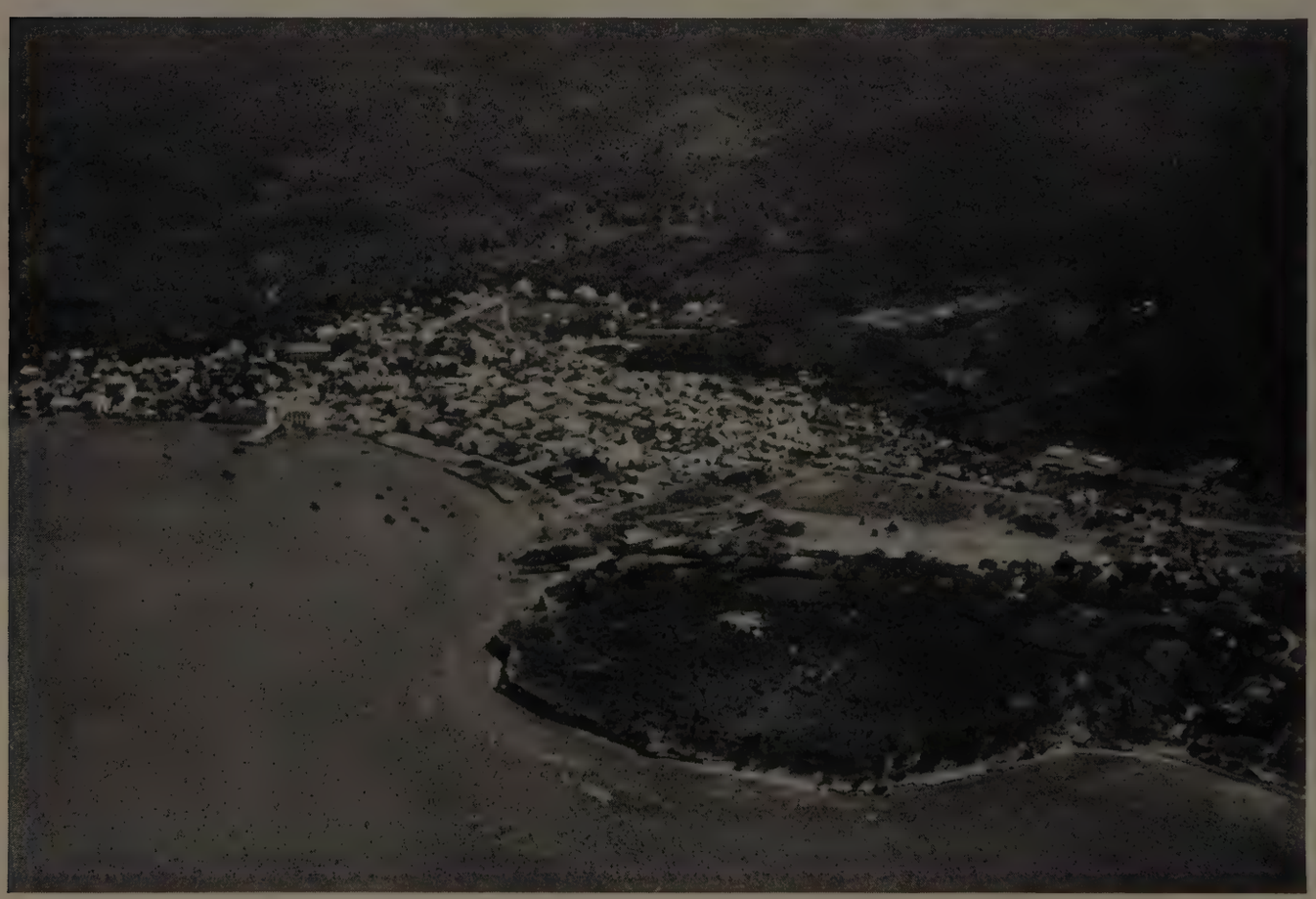
BRINGING MILK TO A CENTRAL STATION AT SAN CRISTÓBAL, DOMINICAN REPUBLIC

To the poorer class of farmers who own no vehicles, transportation is entirely by horseback. Indians called this Caribbean island, which is now divided between two black republics, "Haiti," or "High Land"; Columbus called it Española, later Latinized into Hispaniola.

Photograph by West Indian Aërial Express

THE "SPIRIT OF ST. LOUIS" LANDS AT PORT AU PRINCE

When inter-American air lines are established, one will follow the land bridge of islands from Florida to Venezuela. Frequent fueling stations will leave more space for passengers.



Photograph by R. Colorado

PORT AU PRINCE HAS TASTED BOTH GRIEF AND GLORY

Tempestuous Haiti's civic life has been as stormy as the tropical hurricanes that sweep it. Two million Indians, here when Columbus came, perished from earth. Finally, a free black nation was born of imported slaves. Now, to Uncle Sam, late years have handed the white man's burden of helpful guidance.

TILL NOW ISLAND PEOPLE HAVE DEPENDED ON BOATS

But the day is coming, Colonel Lindbergh believes, when the larger islands of the Caribbean will make more use of aircraft. A waterfront scene at Port au Prince, Haiti.

Photographs by R. Colorado

HAITI'S NATIONAL PALACE, WHERE THE FLYER WAS OFFICIALLY WELCOMED

This immaculate and architecturally pleasing edifice is set in a park around which the chief public buildings of Port au Prince are erected (see, also, page 596). When Colonel Lindbergh visited the palace to be received by the President and his cabinet, he found the palace guard of six-foot native troops drawn up in his honor.

THE SKY PILOT OF INTERNATIONAL GOOD WILL IN HAITI

Because of the speed at which he passed from one country to another, no other "ambassador" ever functioned so fast as Colonel Lindbergh. In two months he paid official calls on twelve presidents and four governors, besides many mayors, commanding generals, and other dignitaries. The flyer is here seen at Port au Prince, with President Louis Borno, of the Republic of Haiti, at his left.

Photographs by R. Colorado

LOOKING DOWN UPON HAITI'S WHITE HOUSE

In 1801 Toussaint L'Ouverture, a former slave, wrote a constitution, proclaimed Haiti free of France, and made himself ruler. But Napoleon took offense; he reëstablished slavery. Toussaint, duped into attending a conference, was captured, taken to France, and there died in jail.

THE AMERICAN FLYER REVIEWS TROOPS AT PORT AU PRINCE

Improved conditions in Haiti are reflected not only by the discipline of such troops, but by the enlightenment of its present-day executives. It has been said of Nord Alexis, who was president of the republic a quarter of a century ago, that when faced with the question of death or pardon for a prisoner, he decided by dropping a clay image on the floor. If it broke, the prisoner must die.

Photographs by R. Colorado

CHRISTIANITY HAS HAD TO COMBAT THE BLACK ARTS IN HAITI

From Africa, with the slaves, came strange superstitions, involving voodooism, signs, portents, traditions of child sacrifice, and belief in the "obeah" curse. Despite the spread of schools, fear of the black arts vanished slowly, especially among the humbler country folk.

Photograph by American Photo Studios

HAVANA GREETS PRESIDENT COOLIDGE, ARRIVING ON THE "TEXAS" FOR THE 1928 PAN AMERICAN CONGRESS

While delegates from the United States, Mexico, and the various Latin-American republics were still in session in the Cuban capital, discussing their

very broken. They say here that an old sailor, asked to describe this island, crumpled up a sheet of paper, put it on a table, and said, "There it is." This was a good way to describe its topography.

Crossing the Dominican Republic and Haiti, I saw many thatched native houses, often perched high up on steep mountain slopes, as in Central America, with cultivated patches around them. Modern villas, trim and comfortable, stood in the plains and valleys near the towns. The countryside in Haiti, I noticed, was much more thickly settled than in the Dominican Republic. The roads were covered with country people walking to and from market.

### COTTON GROWING ON TREES IN HAITI

Before landing at Port au Prince I circled over the bay, then back above the business districts. Here I could see crowds of people out in the middle of the streets. The thing that struck me most in Haiti was the change from Spanish to French. This was the first republic on the tour where Spanish was not spoken; but here, as elsewhere on my trip, I found that many of the people spoke English.

Another sight in Haiti that interested me was a type of cotton which I saw growing on the experimental farm of the Damien Agricultural School. Instead of bushes, this cotton grows on trees 8 to 10 feet high and does not require replanting each year. I was told that it often grows wild in Haiti and produces a good grade of cotton. On this same farm there were fields of cane and sweet potatoes and banana plantations—and many young Haitians were being trained in the methods of modern agriculture.

It was the morning of the 8th of February when I left Haiti for Cuba, on my second longest flight since leaving Mexico City, nearly 800 miles. The *Spirit of St. Louis* had then been in the air, during its life, for more than 459 hours. It had made 167 flights and flown nearly 40,000 miles. Its original motor had never been replaced nor had a major overhauling. Neither plane nor engine had ever had over 5 per cent of replacements; yet both were in fine condition and seemed entirely capable of flying another 40,000 miles or even more. I believe that, with the right care and upkeep, the modern plane and engine should have a minimum life of 150,000 miles.

By 9:20 a. m. I was over eastern Cuba. Below lay a semitropical growth broken by small fields and banana plantations. A few miles away to the south, along the coast, I saw a ridge of mountains rising hundreds of feet above my altitude. To my north was the Guantánamo Valley, covered with fields of sugar cane. Here the whole country looked thickly inhabited and many small towns were in sight.

In the plane with me were three sacks of mail, the first air mail ever carried in the *Spirit of St. Louis*. One bag was from Santo Domingo. Although I left it in the plane for two days while in Port au Prince, it still got to Havana days sooner than it could have by boat.

This territory is waiting for air lines. It holds opportunities for commerce, and for tourists it has unlimited attractions, both climatic and historical. In a few years, undoubtedly, there will be air lines operating between the two American continents, by way of the West Indian Islands, and, in addition, there will be a route between Mexico and Central America. Herein lies a field open now for development with our existing equipment.

### AIRPLANE CAUSES PANIC AMONG WATERFOWL

I flew on over Río Cauto. Ten miles away, to the south, was the Gulf of Guacanayabo. Flat plains extended many miles inland to mountains barely visible on the horizon. Along the coast I saw thousands of waterfowl. They flopped away in panic from my plane. For half a mile out from the beach I could see the bottom of the sea. I saw two sharks, and there were fish in sight up to three feet in length. Some of the larger birds doubled up their wings and fell into the water as the plane overtook them. I flew on, over the interior of Cuba, over many sugar plantations with sugar mills and many good places to land. At 3:40 p. m. I was over Havana.

This beautiful city was very kind to me. It was full of Americans. Its business and social relations with our mainland seemed very close. At its airport I saw the large three-motor planes which

Photograph by American Photo Studios

THE FLYER RECEIVES THE KEYS TO THE CITY OF HAVANA

Before an enthusiastic gathering in Central Park, Mayor Gómez makes the presentation to Colonel Lindbergh.

make daily trips between Havana and Key West.

Here I inspected my plane. Nothing but fuel was needed to put her in shape for the flight home. The motor was still working as well as ever, and the plane itself showed very little wear, in spite of its long flight through the rains and winds of hot countries.

From Havana I planned to fly to Key West, and then up the Gulf coast to a point where I might take up a compass course for St. Louis. As I have said, I do not believe it wise to make unnecessarily long flights in a single-motored plane over water. That was why, on this tour, I always reduced the water hops to a minimum.

### LEAVES HAVANA ON FIRST ANNIVERSARY OF LAST FLIGHT AS AIR-MAIL PILOT

It was February 13 when I took off from Havana. To me this was a significant anniversary. I had taken off from Bolling Field for Mexico City exactly two months before. It was a just a year after

I had made my last flight as a mail pilot from St. Louis to Chicago.

I started in the rain and fog and came back in it. Soon after I left Havana, very early in the morning, I ran into rain and poor visibility. By the time I got over north Florida the clouds were so low that I was flying within a few feet of the tree tops. At the Georgia line wisps of fog hung to the ground, and often I had to fly by instruments. It was so all across Georgia and Alabama.

I kept the ground in sight when I could. If the fog got too thick, I flew by instruments, high enough to clear the hilltops, until, through some hole in the mist, I could again see the ground. Once I went up to 7,000 feet before reaching clear sky.

Through Tennessee and Kentucky it got a little better, but as I neared St. Louis it again became difficult to keep contact with the ground.

Photograph by Underwood & Underwood

CUBA'S PRESIDENT DECORATES THE FLYER

The Grand Cross of the Order of Miguel de Céspedes is the highest honor Cuba can bestow. President Machado pinned this on Colonel Lindbergh. Only six others have ever received this medal.

Picking up St. Louis, I flew along its waterfront; but I could not circle over the city, as high buildings extended up into the clouds. North of town the smoke and haze grew so thick that I pulled up to 1,200 feet and flew several miles before coming down again. Then I followed the Missouri River around to St. Charles. Guided from there by a paved road which I knew, I flew to Lambert Field.

### IN THE AIR 125 HOURS ON TWO-MONTHS' TRIP

It was 5:10, central time, when I landed, after a flight of fifteen hours and 35 minutes from Havana.

Flying in the fog is still our greatest problem in air traffic.

My air excursion over Latin America took exactly two months. I was in the air over 125 hours and flew over thirteen countries.

During this time I was treated with the courtesy and hospitality which is traditional of Latin America.

Space will not allow the expression of my gratitude to the countless friends I left in our sister countries, but I have returned home with the feeling that the ties of friendship existing between the American republics are far too great ever to be broken by misunderstanding.

© Aëro Service

AN AIRPLANE VIEW OF MOUNT VERNON

In the foreground is the entrance to the serpentine drive, which winds its sinuous way to the door of the mansion (see Color Plate XIII). On each

# THE HOME OF THE FIRST FARMER OF AMERICA

By Worth E. Shoults

Author of "Hospitality of the Czechs," in the National Geographic Magazine

"NO ESTATE in United America is more pleasantly situated than this. It lies in a high, dry, and healthy country, 300 miles by water from the sea . . . on one of the finest rivers in the world."

Thus the famous master of Mount Vernon appraised America's most cherished shrine when writing of it to a friend in 1793.

The broad expanse of the Potomac, the wooded beauty of the Maryland shore beyond, and the combined charms of the great trees, spacious lawns, and flowering gardens of the estate itself remain to-day much as they were when Washington wrote of them.

The first white proprietors of this superbly located plot of land were two old prospectors, who by authority of the Royal Governor patented it nearly 300 years ago. They made no effort, however, to comply with the provisions of the law which required them to place tenants on the property, and in consequence their title to 4,000 acres reverted to the Commonwealth.

### MOUNT VERNON ONCE SOLD FOR $900

In 1674 the patent to the land, along with some additional acreage, was reissued by Lord Culpeper to John Washington and Nicholas Spencer. Three Washingtons held the land before it came into the possession of Augustine, father of Lawrence and George, who purchased it from his sister for $900 and built the first house on it about 1734. This small dwelling was burned five years later, and its owner moved with his family to a farm near Fredericksburg, where he died in 1743.

Under the provisions of his will, the estate on the Potomac passed to Augustine's son Lawrence, who made his residence there and gave the place its name in honor of Admiral Vernon, of the British Navy, under whom he had campaigned against the Spaniards in the West Indies and for whom he entertained a deep respect and affection.

Uncertainty shrouds the origin of the present mansion. Certain of the records indicate that Lawrence Washington began its construction, while others seem to show that his father built it.

In 1747 George Washington came to Mount Vernon to make his permanent home with his high-minded and cultured half-brother.

### TOBACCO WAS THE PRINCIPAL CROP OF COLONIAL VIRGINIA

During Lawrence Washington's mastership, Mount Vernon began to assume a position of some importance in the Colony. The able young proprietor was active in public affairs. He was appointed adjutant of his military district by the Royal Governor and several times represented his county in the Virginia House of Burgesses. He was also much interested in projects for the colonization of frontier lands and served as president of a company formed for that purpose by a group of prominent Virginians.

Lawrence Washington died in 1752, and left Mount Vernon to his infant daughter, Sarah, who survived her father by only a few months. On her death the property went to George, with certain provisions as to the widow's rights in the income derived from it. This entail the new owner soon purchased for an annual price of ". . . the sum or quantity of fifteen thousand pounds of tobacco in fifteen hogsheads . . . or as much current money of Virginia in lieu thereof as will be equal thereto at twelve (12) shillings and six pence, current money, for every hundredweight of tobacco." Before he had reached his majority, George Washington was the sole proprietor of Mount Vernon, then an estate of 2,700 acres.

The Mount Vernon of 1752 and that of to-day, which is essentially as George Washington left it, were not much alike. The house was a simple one, without the present mansion's third story, banquet hall, library, or the chambers above these additions. Neither did it have the colon-

nades or the great portico overlooking the river.

The old brick barn, built by Augustine Washington nearly 20 years earlier, had survived the fire that destroyed his house and is still standing, the oldest structure on the estate. This, with a few slave cabins, were the only outbuildings then existing. Indeed, it was not until after George Washington married that he began to improve his holdings on a large scale.

### WASHINGTON FOUND HAPPINESS IN FARMING

Like most Virginians of his day, the future Father of His Country was possessed of a lively land hunger, and by gradual acquisition he increased his Mount Vernon property from the 2,700 acres which he had inherited to a domain of approximately 8,000 acres.

The management of so great a holding presented large problems of administration, but no man in the colonies was better fitted than George Washington to meet them successfully. He was by natural instinct a farmer, and he found his greatest happiness in his marriage and the care and development of his home. He wrote to a relative in England, soon after his marriage: "I am now, I believe, fixed at this seat with an agreeable consort for life. And hope to find more happiness in retirement than I ever experienced amidst a wide and bustling world."

But Washington was not content to be a country gentleman who farmed in the disastrous manner then generally in vogue in Virginia. He early realized that extensive and unbroken tobacco planting was ruinous to the soil, and in 1785 wrote to Mr. Fairfax in England: "Our course of husbandry in this country, and more especially in this State, is not only exceedingly unprofitable, but so destructive to our lands that it is my earnest wish to adopt a better. . . ." At Mount Vernon he grew only so much tobacco as was absolutely necessary in an age when the soporific leaf served as a medium of exchange. Wheat, corn, turnips, and hay he raised extensively, pursuing a careful system of crop rotation and fertilizing his fields liberally.

Mount Vernon was the first real experimental farm on the North American Continent. Washington made of his estate an agricultural laboratory, wherein he put to practical application the new theories of soil cultivation and stock breeding that were then being expounded successfully in England.

For years prior to the Revolution, he experimented in a comparatively small way, and while the struggle for liberty put an end to these activities for a time, it enabled him frequently to come in contact with the methods of agriculture used in the other colonies. As a result, he accumulated much valuable information which he put to good use in later years.

His return after the war marked the beginning of an era of energetic effort to improve and beautify the place he loved so well. Plants, seeds, and cuttings were imported from Europe, while many more were received from friends, both at home and abroad.

### THE MULE STOOD IN HIGH FAVOR AT MOUNT VERNON

In General Washington's day mules were not commonly used in America and those that were seem to have been of an inferior breed. He made earnest efforts to better the stock and was greatly aided in his experiments along this line by two gifts from abroad. Lafayette sent him two spirited jennies and a jack from the Isle of Malta, while the King of Spain also made him a present of a similar trio of high-bred Spanish stock.

In writing to his friend Arthur Young in December, 1788, Washington expressed his opinions of these animals:

"The Spanish jack seems calculated to breed for heavy slowdraught; and the others (the Lafayette jacks) for the saddle or lighter carriages. From these, altogether, I hope to secure a race of extraordinary goodness, which will stock the country. Their longevity and cheap keeping will be circumstances much in their favor. I am convinced, from the little experiments I have made with the ordinary mules (which perform as much labor with vastly less feeding than horses), that those of a superior quality will be the best cattle we can employ for the harness; and indeed in a few years I intend to drive no other in my carriage, having appropriated, for the sole purpose of breeding them, upwards of twenty of my best mares."

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ST. HELENA WILLOWS STAND GUARD ALONG THE MOUNT VERNON RIVER-FRONT

A quarter of a century ago, these trees were planted as bulwarks against seepage and the incursions of the tides of the Potomac. They were slipped in direct line from a beautiful tree that once grew by the grave of Napoleon at St. Helena.

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SPRING IS PRODIGAL WITH HER CHARMS AT MOUNT VERNON

From the dormer window of her bedroom, which may be seen between two cedar trees, Martha Washington could look out along the slope of the hillside to the grave of her husband. Most of the smaller planting at Mount Vernon is of recent origin, but some of the large trees date back to the tenure of the illustrious master.

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Autochrome by Clifton Adams

AMERICA'S MOST HALLOWED SHRINE

George Washington came to live at Mount Vernon as a boy, and for fifty-two years, until the day of his death in 1799, it was the home of his heart. The two large pecan trees in the picture were seedlings when presented by Thomas Jefferson and planted by Washington. Mount Vernon was named in honor of Admiral Vernon of the British Navy, under whom Lawrence Washington served in a West Indian campaign.

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THE GREAT PIAZZA SAW MANY A LAVISH ENTERTAINMENT

Hardly a day passed during Washington's proprietorship at Mount Vernon that guests were not present. The latchstring was ever out, for friend and stranger alike, and in mild weather much of the entertaining was done on this broad veranda which commands a superb view of the Potomac (see, also, Color Plate XII).

© Mount Vernon Ladies' Association

THE LIBRARY WAS GENERAL WASHINGTON'S WORKSHOP

The desk and its chair were willed by the master to his friend and physician, Dr. James Craik. After wandering for more than a century, they were returned to Mount Vernon in 1905. The globe also belonged to General Washington, as well as some of the books and the wall thermometers hanging on each side of the secretary

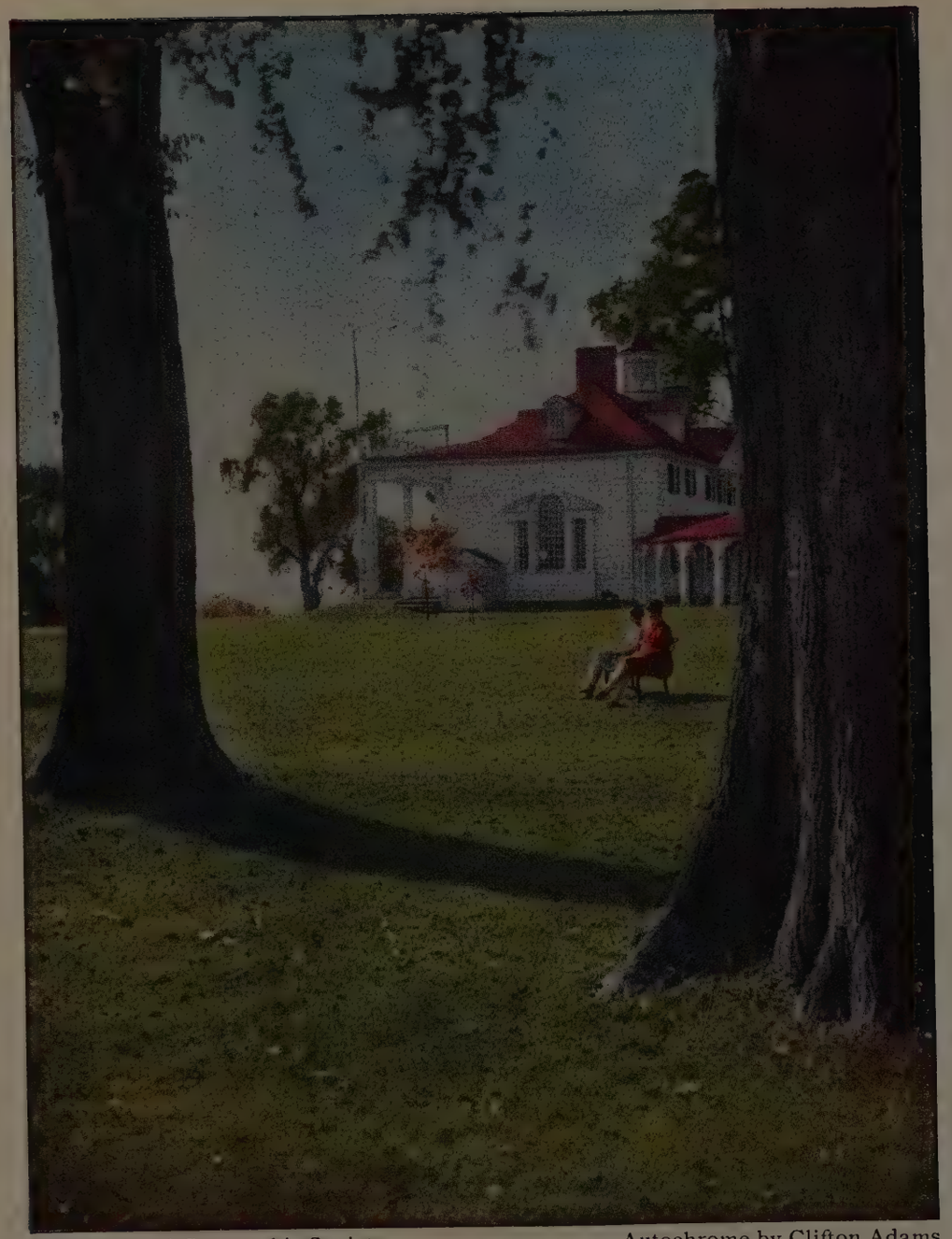
THE CENTRAL HALL AND STAIRWAY OF THE MANSION

The large clock on the stairs and the hanging lantern were brought to the mansion by Lawrence Washington. In a frame on the wall at the left is the key to the Bastile, presented to General Washington by Lafayette after the capture of the fortress prison by the Revolutionists in 1789. In a case above the table at the right are four of Washington's swords.

© Mount Vernon Ladies' Association

THE BANQUET HALL'S CONSTRUCTION WAS SUPERVISED BY POST

The lavish hospitality that was so freely extended at Mount Vernon necessitated a very large dining room. At General Washington's death there were twenty-seven mahogany chairs in this room. The marble mantle was presented to him by an English admirer and the clock, candlesticks and vases are all original furnishings.



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ASH AND ELM PROVIDE A FRAME

Across the spacious lawns this vista of the east end of the mansion provides an excellent view of the beautiful banquet hall window. This

Autochrome by J. H. Dorsett

BLOSSOM TIME IN OLD VIRGINIA

Few estates in the Colonies could boast such exquisitely planned and executed gardens as those at Mount Vernon. One of the great Presi-
dent's hobbies was the beautification of his home, and the Mount Vernon

© National Geographic Society

Autochrome by J. H. Dorsett

ONE OF THE SERVANTS' HALLS AT MOUNT VERNON

Distances were great in colonial days, and when gentlemen traveled they went by coach and took with them a numerous retinue of attendants. They usually stayed overnight at some convenient plantation, and the generous and flexible social code of the times decreed that when a guest arrived, invited or otherwise, he should be quartered in the master's house. His attendants found accommodations in the servants' quarters, and his horses were stabled and fed. At Mount Vernon there were two sizable servants' halls; this is the East Quarter.

Autochrome by Clifton Adams

THROUGH THE ARCHES OF THE EAST COLONNADE

Although they create a distinctively decorative effect, these curved and covered colonnades were not primarily intended as ornaments. They served the utilitarian purpose of connecting the mansion with the white servants' quarters on the east and with the kitchen on the west.

© National Geographic Society Autochrome by J. H. Dorsett

GENERAL WASHINGTON PERSONALLY DESIGNED THESE PARTERRES OF BOXWOOD

Many of the original plants were destroyed by a fire in 1835, but these were replaced by cuttings from the remaining stock and the garden now appears much as it did a century and more ago.

WINDING PATHS INVITE ONE TO WANDER AMONG THE FLOWERS

Many of the plants in the garden at Mount Vernon were imported from England and so solicitous was General Washington of their welfare that he frequently supervised the gardening in person. He also received many shrubs as gifts from friends and admirers.

© National Geographic Society Autochromes by Clifton Adams

WHERE SPRING AND SUMMER PILGRIMS TO AMERICA'S SHRINE DEBARK

A steamer brings visitors from the National Capital down the Potomac to the home and tomb of Washington, and they land at the same spot where he was wont to embark in colonial days.

© National Geographic Society

Autochrome by Clifton Adams

MOUNT VERNON IN WASHINGTON'S DAY WAS A COMMUNITY IN ITSELF

Large plantations were self-contained units, raising practically all the food required, and spinning and weaving much of the cloth used. The master's family purchased clothing in the cities or even direct from England, but itinerant tailors, shoemakers and other artisans traveled from one estate to another making garments and footwear for the servants. At Mount Vernon, most of these [illegible]

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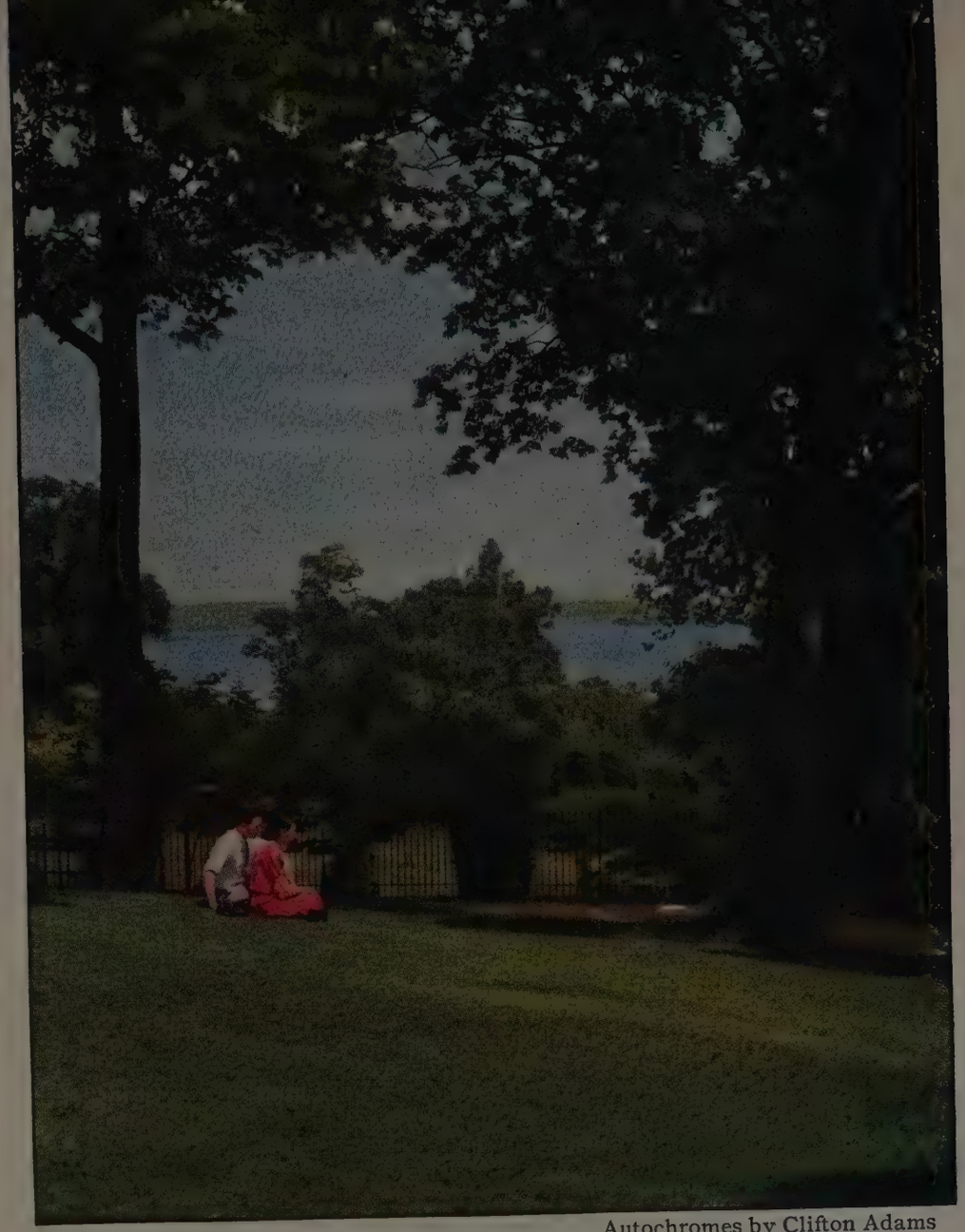
THE SUMMERHOUSE OVERLOOKING THE POTOMAC AT MOUNT VERNON

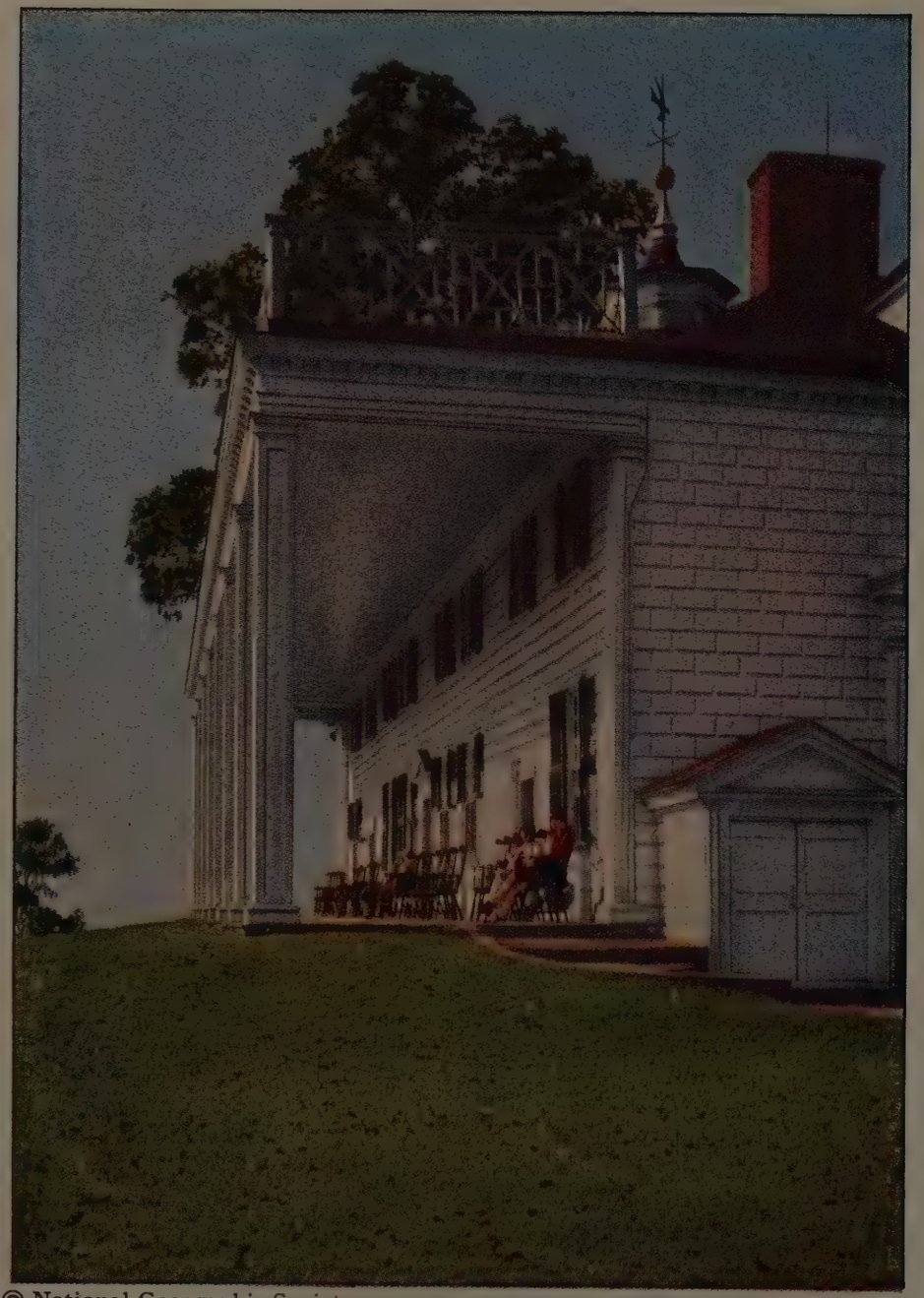
This little rest and beauty spot is a reproduction, built on the foundations of its predecessor, by the school children of Louisiana. It conforms to the original in general line and proportion. In General Washington's time a bell which regulated the hours of labor on the estate



Autochromes by Clifton Adams

LOOKING FROM MOUNT VERNON TOWARD FORT WASHINGTON, MARYLAND

The iron fence marks one of the limits of Mount Vernon's deer park, first stocked in 1785. Underground springs were formerly the cause of frequent minor slides and cave-ins along the hillside, but in 1904 this menace was removed by running tunnels into the hill, thus draining off 20,000 gallons of water daily.



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WASHINGTON OFTEN EXERCISED ON THE PORCH

During the winter months, when the roads were impassable, the owner made a practice of pacing up and down this portico for an hour

Autochromes by Clifton Adams

A "BUILT-IN" SCHOOLHOUSE

When Mrs. Washington's two grandchildren came to live at Mount Vernon, this little structure, originally built into the garden wall as a seed

© National Geographic Society

Autochrome by Clifton Adams

THE GALLANT EQUIPAGE OF MANY A FAMOUS GENTLEMAN HAS TRAVELED THIS ROAD

This is the entrance to the Serpentine Drive, which runs by the front door of the mansion. Man and Nature have joined forces to embellish Washington's home. There is no fairer corner in the Old Dominion.

A REPLICA OF THE ORIGINAL COACH HOUSE

The coach which is kept inside, while similar to General Washington's, did not belong to him, but has been pretty definitely identified as the property of Mr. Samuel Hare Powel, mayor of Philadelphia when that city was the National Capital.

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CONTINUOUS BLOOMS DISTINGUISH THIS CORNER OF THE GARDEN

General Washington arranged the planting so that from early spring to late fall there were always flowers in bloom. The little white house was built for architectural effect and later used as a schoolroom (see Color Plate XII).

AN IVY MANTLE EMBOWERS THE TOMB

The remains of George and Martha Washington rest within two marble sarcophagi in the vestibule of the family vault. The monuments to left and right are to Bushrod and John Augustine, nephew and grandnephew, respectively, of George Washington.

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THE ORIGINAL FAMILY VAULT HAS BEEN ABANDONED FOR A CENTURY

In 1830, a dismissed and disgruntled employee broke into this tomb at night and stole what he believed to be the General's skull. He was mistaken, but the attempt aroused the family to the need for a new vault (see above).

IN THIS ROOM WASHINGTON BREATHED HIS LAST

The great four-poster canopied bedstead is the one upon which General Washington succumbed to pneumonia on December 14, 1799. The armchair was his mother's and in it she nursed him. At the right is his dressing room.

© Mount Vernon Ladies' Association

THE RUG IN THE WEST PARLOR WAS A ROYAL GIFT

This floor covering was especially made for General Washington by order of Louis XVI of France, and has the design of the coat of arms of the United States woven in it. However, by a strange train of circumstances, it was never received by him and only after more than a century of adventures did it arrive at the home for which it was intended.

Seed and soil tests were undertaken, as well as stock breeding, and the General engaged in a voluminous correspondence with the leading agricultural experts in Europe. To have achieved the productivity that he did from Mount Vernon's naturally none too fertile acres is a standing tribute to the agricultural genius of Washington the farmer and, together with the many successful experiments he conducted there, justified the use of that title which pleased him most—"The First Farmer of America."

### WASTED TIME WAS ABHORRENT TO GENERAL WASHINGTON

General Washington's capacity for the practical application of his advanced agricultural theories was in evidence in the large barn which he built on the Dogue Run Farm. It was a sixteen-sided brick structure, the construction of which he supervised and the plans for which he drew. The bricks for it were baked on the estate, and among its unique features was a circular threshing floor, the boards of which were laid so as to leave regular and frequent interstices, through which the flailed or trodden grain could fall into bins built beneath.

A motive which probably impelled the master of Mount Vernon to include this innovation in his new barn was his abhorrence of wasted time. By providing a good threshing place indoors, he was able to be independent of the weather in preparing his grain and made it unnecessary for his slaves to remain idle because of rain or cold.

It was often difficult for Washington to inculcate his overseers with his progressive ideas. One instance of this difficulty occurred in connection with the use of the new barn and threshing floor, which caused the General to grow wrathy. He had ordered a large part of his wheat stored in the barn for threshing. On returning to the farm after a short absence he found that an overseer had removed the wheat from the barn and had had it trod out in the open only a few yards from the newly designed threshing floor. History does not record the exact events that followed.

For greater convenience, the Mount Vernon estate was divided into five farms, ranging in size from the comparatively small Mansion House Farm to the River Farm of 2,027 acres. On each of these there were slave quarters, an overseer's house, and barns and other outbuildings. On one of them, the Union Farm, there was a brick barn, which Washington described in a letter to Arthur Young in December, 1793, as "equal, perhaps, to any in America, and for conveniences of all sorts, particularly for sheltering and feeding horses, cattle, etc., scarcely to be exceeded anywhere. . . ."

An overseer was in direct charge of each of these farms, but General Washington did not leave the management entirely in their hands. At such times as he was able to be on his estate, he made daily rounds over the whole of it and gave very minute and specific directions. He was a particularly fine horseman, and his giant form astride one of his favorite mounts was a familiar sight in all parts of Mount Vernon, for no feature of its affairs was too insignificant to command his personal attention. When he was away from home he wrote a weekly letter of instructions to his manager and received in return a weekly report.

Even during the trying days of the Revolution he continued the practice, and it was during this period that he supervised, (by post), the enlargement of the mansion.

### HOSPITALITY REQUIRES A LARGER HOME

Just before the war General and Mrs. Washington had come to the conclusion that the demands upon them for entertaining would necessitate an enlargement of their residence. Work actually began in the spring of 1775, but before it was more than well started the master was called away to take command of the army. His kinsman, Lund Washington, took over its active direction, but the interior construction work was not completed until 1786, after the General's return. The mansion, as it stood then and as it stands to-day, was of Virginia pine sheathing, designed and painted to resemble stone blocks, and built over a framework of oak. The foundations were of brick and real sandstone; the roof of cypress shingles.

Life at Mount Vernon, prior to the coming of Martha Washington, had not been very regular. The master was frequently away in the army or on survey-

Photograph by Clifton Adams

THOUSANDS VISIT MOUNT VERNON BY BOAT EACH YEAR

A side-wheeler leaves Washington twice daily during the spring and summer months for Mount Vernon. By rail, automobile, and boat, as many as 90,000 pilgrims have visited Mount Vernon in one summer month.

ing trips, and it was not until after his marriage that he settled permanently at his Potomac estate.

### MRS. WASHINGTON BROUGHT CHARM TO MOUNT VERNON

Mrs. Washington brought with her all the necessary attributes to make her régime successful. Personal charm and domestic and administrative ability were hers in generous measure, while the large fortune and numerous slaves that accompanied her were also of great importance to the development of the estate.

Now it was that many of the outbuildings began to appear—additional slave quarters, a shoemaker's house, a spinning house, and greater storage facilities.

Practically all the food consumed was raised on the place. The slaves subsisted largely on corn meal, pork, turnips, and a few other vegetables, all of which were home-grown. For the use of the table in the great house, wheat, fruits, sheep, and cattle were raised.

The hospitality at Mount Vernon was bountiful and seldom did the Washington family sit down to dinner alone. Anywhere from one or two to a dozen or more guests were in almost constant attendance—sometimes for a meal only, sometimes for one or more nights' lodging as

well. The latchstring was out to any traveler, and frequently General Washington notes in his diary that a gentleman or lady, whose name was unknown to anyone in the household, dined there.

There was no austerity in the life of the great estate. Dances and games were frequently arranged, and both master and mistress participated in the festivities or frivolities. While General Washington had no children of his own, Mrs. Washington's two children by her first marriage, John and Martha Custis, and later her grandchildren, George Washington Parke Custis and Nellie Custis, lived at Mount Vernon and supplied the notes of youthful gaiety.

Hunting was a favorite diversion. General Washington took keen delight in following the hounds over his broad acres. His diary records many incidents of the chase and also the purchase in London of a complete hunter's costume. He was as determined in his play as in his work, and the fox raised by his pack was very likely to lose its brush. On one occasion, however, the General received more than he bargained for, recording that he "went a hunting and catched a fox and the ague."

Fishing at Mount Vernon was mostly a task for slaves with seines and drags, but occasionally the master and some of his guests would try their hand with hook and line. One of the old slaves was frequently to be seen on the river engaged in snaring perch and bass, or netting shad for his master's table; another retainer was charged with keeping the larder supplied with game, and many a canvasback, mallard, and wild turkey fell before his old flintlock.

### PILGRIMS BEGIN TO ARRIVE

The last years of Washington's residence at Mount Vernon saw the beginnings of that steady stream of pilgrims to his home that has continued unabated ever since. He was no longer merely a Virginia country gentleman, but the ex-President of the Republic and a figure of world-wide importance. Prominent men and women from all parts of the Union and from abroad came to Mount Vernon to do him homage. Veterans of his Continental Army came to voice their devotion to their leader. Simple curiosity brought many others. He was gracious and hospitable to all.

Mount Vernon was never a financially profitable undertaking and contributed to Washington's great wealth only in the enhancement in value of its acres. The estate was simply a diversion in the hands of its great master, with the improvement and management of which he refreshed himself from the cares of public life. However, as he grew older the establishment became burdensome and at one time he seriously considered leasing all of it except the Mansion House Farm, which, in his own words, he intended "reserving for my own residence, occupation, and amusement in agriculture."

### DEATH COMES SUDDENLY

While making his usual daily ride around the farms on Thursday, the 12th of December, 1799, he was caught in a sudden storm of sleet and snow, which turned to cold rain as he rode home. He did not deem it necessary to change his clothes on arriving at the mansion, and apparently suffered no ill effects the next day, for on Friday he marked out a number of trees between the house and river that he wished felled to improve the view. There was slushy snow on the ground, and that evening he appeared to be contracting a cold, but refused to take any remedy. He became ill during the night and died the following evening (Saturday, December 14, 1799) shortly after 10 o'clock. With such simple ceremony as he would have wished, his remains were consigned to the tomb which he himself had built.

Under the terms of his will Mrs. Washington remained in possession of Mount Vernon until her death. She closed the General's bedchamber and thereafter occupied what had previously been a storeroom, just above it, but from the window of which she could see her husband's tomb.

A story has long been circulated to the effect that Mrs. Washington closeted herself there and denied audience or entrance to all save her maid and her cat. For the convenience of the latter she is said to have caused a hole to be cut at the bottom of the door, so that it might pass in and out at will. But, like many other legends concerning Mount Vernon, this

Photograph by Maynard Owen Williams

MAJESTIC CEDARS FLANK THIS PILGRIM PATH TO THE TOMB

The visitors to Mount Vernon's hallowed precincts include representatives of every creed, color, and clime. It is not uncommon for half a hundred floral tributes to be placed at the tomb in the course of a year. In many instances these come from foreign visitors, for royalty or other persons of distinction from abroad seldom fail to pay their respects to the memory of the First American.

one has no foundation in fact. A hole was in the door, but it was made for a cat that lived long after Martha Washington died, and the room had been again converted into a storage place. And the purpose of thus humoring tabby was to keep down the mice.

### A COSTLY HOME TO MAINTAIN

Less than three years after General Washington's death his wife was laid to rest in the tomb beside him, and Bushrod Washington, his favorite nephew, became the master of Mount Vernon and maintained an unostentatious but graceful hospitality there for 27 years. He bequeathed the estate to his nephew, John Augustine, who died two years later, leaving it to his widow, from whom it passed to their eldest son, John Augustine Washington, the last private owner.

The upkeep of the estate proved a heavy drain on the financial resources of those who succeeded its great owner. General Washington himself had ample means to maintain it, despite its extensive and unfertile acres, but his large fortune was so divided among his relatives that none of them was made rich by it. As a result, the place fell into a lamentable state of

Photograph by Clifton Adams

FROM THIS SIDE WASHINGTON'S VISITORS APPROACHED

The large door at the center of the mansion still bears its original brass knocker. The sundial, posts, and chains are all restorations of features marking the estate in the days of Washington's occupancy. Through the colonnade at the right one may glimpse the waters of the Potomac.

disrepair and was faced with utter ruin, when Miss Ann Pamela Cunningham appeared as a ministering angel to save it.

The story of this remarkable woman's patriotism and courage in the face of almost hopeless odds is inspiring.

It was Miss Cunningham's mother who first suggested the organization that became the Mount Vernon Ladies' Association. As she passed up the Potomac one moonlight night in 1853, she was impressed and saddened by the neglect and desolation that marked the home and tomb of Washington.

In a letter to her daughter she suggested the idea that the women of America should save Mount Vernon. Miss Cunningham, a semi-invalid, determined to convert the idea into a reality. Her friends and relatives tried in vain to dissuade the fragile crusader from what seemed an impossible task, but she was not to be turned from her labor of love.

She began her campaign by addressing to the "Women of America," through the press, a stirring appeal to make a united effort to preserve the home of Washington as a national shrine. This was 75 years ago, when women seldom interested themselves in anything outside of home and church circles; so she signed her appeal not with her own name, but simply as "The Southern Matron."

### THE WOMEN OF AMERICA SAVED WASHINGTON'S HOME FROM RUIN

The Mount Vernon Ladies' Association was organized in 1853 and its founder wrote: "The intention was simply to raise $200,000; give it to Virginia, to hold title and to purchase 200 acres of the Mount Vernon property, including the Mansion and Tomb—Virginia to keep it for a public resort. The ladies to have it in charge and adorn it if they could have the means."

The movement received support from all parts of the country, and Miss Cunningham appointed vice-regents for each State in the Union, vesting them with full power to raise funds for the work. In 1856 she enlisted Mr. Everett's silver

© Leet Brothers

DECREPIT MOUNT VERNON AS IT APPEARED 69 YEARS AGO, WHEN ACQUIRED BY THE LADIES' ASSOCIATION

tongue in behalf of the Association, and that gifted orator raised more than $69,000. In 1859 the possession of Mount Vernon passed from Mr. John Augustine Washington, great-grandnephew of the General, to "The Mount Vernon Ladies' Association of the Union."

The Civil War delayed the work of rehabilitation, but nothing could daunt the spirit of the Regent, and shortly after the close of the struggle she was again actively at work.

Soldiers of North and South had alike respected Mount Vernon during the course of the fratricidal conflict that so scarred other parts of Virginia.

### THE COLONIAL ATMOSPHERE IS PERMANENTLY PRESERVED AT THIS NATIONAL SHRINE

At the commencement of the war the Government had seized the little steamer which the Association used to carry visitors down the river from Washington. Several years after peace was restored, and largely due to Miss Cunningham's efforts, a $7,000 indemnity was paid for this seizure, and the money was used to start the work of renovation and reconstruction.

"The Southern Matron" resigned the Regency of the Association in 1874, and in her farewell address to her associates she set forth a policy which has been strictly adhered to by her successors. She said:

"Ladies, the home of Washington is in your charge—see to it that you keep it the home of Washington. Let no irreverent hand change it; no vandal hands desecrate it with the fingers of progress. Those who go to the home in which he lived and died wish to see in what he lived and died. Let one spot in this grand country of ours be saved from change. Upon you rests this duty."

How well this charge has been accomplished and this duty performed is apparent in the Mount Vernon of to-day. As nearly as human care and ingenuity can keep it so, it is the home in which Washington lived and died.

The Association is in the paradoxical situation of having made excellent progress—backwards. Careful study and research have revealed much about the mansion and grounds in the heyday of the estate. The landscaping of the grounds and gardens is practically as Washington left it, while the outbuildings, walls, and hedges have been faithfully restored.

LOOKING FROM AN AIRPLANE AT THE MONUMENT MARKING GEORGE WASHINGTON'S BIRTHPLACE

The great soldier and statesman was born at Wakefield, in Westmoreland County, Virginia. In recent years an association has been formed to construct and preserve a replica of the house in which he was born (see text, page 628).

When Mount Vernon became the property of the Ladies' Association it was almost devoid of furnishings, and the task of reassembling the original pieces has been a stupendous one. Under the terms of Mrs. Washington's will they were so distributed that the ensuing century saw them scattered all over the Union. To bring back the large number of authentic relics that are now at Mount Vernon has required diligent effort over a long period of years on the part of the ladies of the Association and others interested in the complete restoration of the old home.

### KING LOUIS' RUG A CENTURY LATE

Some of the relics have had particularly interesting and checkered careers. For example, the rug in the west parlor with the coat of arms of the United States woven in its center. This rug was especially made by order of Louis XVI of France and sent to General Washington as a present, at Philadelphia, while he was President. Because of diplomatic considerations, he declined the gift, saying that he could not properly accept it "at this time." Accordingly, the rug was stored at the customhouse in Philadelphia with the intention of again offering it to General Washington when he became once more a private citizen. Through some mistake, it was included among the articles disposed of in a customs sale, and for more than a century passed from one place to another until in 1897 it was finally located by the authorities of Mount Vernon and brought to the home for which it was originally intended (Color Plate XVI).

In one respect only has modernity been tolerated: the Ladies' Association has provided the most up-to-date equipment obtainable to safeguard the buildings and their precious contents from the hazards of fire. It is doubtful if any frame building in the world has a better fire-protection system.

An abundant supply of water is kept in storage tanks, and there are at hand engines capable of forcing it with a pressure equal to that available in the city of Washington. Chemical apparatus is instantly available, and in the frequent tests that

are made never more than two minutes elapses between the sounding of the alarm and the play of both water and chemical streams at any given point.

All the equipment, while so disposed as to be instantly available, is concealed from public view.

Every condition which might contribute accidentally to a conflagration has been eliminated. There are no fires about the mansion or its adjacent buildings, the whole unit being heated by hot water radiation from a subterranean boiler room located 400 feet away. All lighting of the buildings is by a most carefully protected system, which was especially designed by Mr. Thomas A. Edison and installed under his personal direction. In the Mansion itself there is no wiring whatever, and when it is necessary to light it, portable storage batteries are used to supply the power.

The shingle roofs of the buildings are sealed underneath by a packing of rock wool held in position by sheet rock, and in the apex of each structure is a system of piping so arranged that in the event of a fire carbonic acid gas could be released. This, being heavier than air, would travel down through the interstices between the outside sheathing and the plastering of the walls and smother a fire there in its incipiency.

### EVERY VISITOR HELPS THE SHRINE

Every visitor to Mount Vernon becomes a supporter of this national shrine by paying a small admission fee. The sum total of these fees, economically administered by the ladies of the Association, who hold the property in trust for the Nation, is sufficient to maintain appropriately the house and grounds and to protect it from spoliation.

A much greater amount of management and labor is involved in keeping Washington's home as he left it than is generally supposed. Sixty-five persons are employed on the premises.

Time was when many of the visitors attempted to carry away everything they could lay hands on; but the souvenir vandal is now disappearing. One selfish individual, when admonished for cutting flowers in the garden, replied defiantly that as she had contributed a dollar to the purchase fund, the place was partly hers, and she would cut as many flowers as she pleased! On the whole, however, visitors accord that whole-hearted respect and veneration that is due the memory of Washington.

### BIRTHPLACE TO BE RESTORED ALSO

Within the last few years a movement has been started to restore Washington's birthplace at Wakefield, Virginia. The house in which he was born was destroyed by fire in 1780, but the Wakefield National Memorial Association is raising funds by public subscription to rebuild it on the original site (see illustration, page 627). Exhaustive research and a careful survey of the ruins have revealed much information about the structure of the house, and the officers of this patriotic association hope to have a replica ready for dedication on February 22, 1932, the bi-centennial of Washington's birth.

Among the most interesting features of the estate to the hundreds of thousands who annually make the pilgrimage to Mount Vernon are the venerable attendants at the tomb, who long ago learned that the impression they made on visitors was in direct ratio to their proclaimed length of service. As a matter of fact, none of them has been many years at the post, but one who does not proclaim himself a son or grandson of the original guardian is afflicted with a stunted imagination. Not so many years ago there was one dusky individual who claimed to have served the General in person!

No finer thrill of patriotism, no greater sense of pride and pleasure in being an American citizen, can be experienced than when one treads the sacred ground of Mount Vernon. Here the greatest American spent the happiest days of his life, and here he passed to the Great Beyond.

Every vessel that passes up and down the Potomac tolls its bell as it glides past this hallowed spot, and the heart of every American beats faster and truer as he does homage at the tomb of the Father of Our Country.

Washington has taken his place in history as one of the immortals; yet it was a very lovable, a very human Washington who lived at Mount Vernon. There, relaxed from the cares of state and of military leadership, he was simply George Washington—genial host, generous neighbor, and affectionate husband.

# A VACATION IN A FIFTEENTH CENTURY ENGLISH MANOR HOUSE

By George Alden Sanford

THIS is how it came about. It had become our habit to take our vacations seriously, their function being by complete change of scene and surroundings to restore a feather edge to jaded mentalities.

The vacation list since the World War has included—usually in a furnished house of our own, from which to radiate in all directions—the island of Nantucket; the Rocky Mountains in Colorado; Ilfracombe, north Devonshire, England; Lake Champlain, New York; motoring in Nova Scotia; the Zea Droom (Sea Dream) Cottage, near Alkmaar, Netherlands; Cape Cod, and an English rectory, 39 miles southeast of London, on the Thames.

On our return from this last English vacation two friends suggested that next time we should secure a house sufficiently large to accommodate a family of ten, and to syndicate the expense.

Thus, in due course of time, we found ourselves installed in a quaint old Tudor Manor House on the Thames eight miles below Oxford. The family syndicate consisted of Mr. and Mrs. B., to whom, alas, the fates were unkind, for at the last moment it was decreed that Mr. B. should not leave the purlieus of Broadway; Mr. and Mrs. L. and their charming daughters, most excellent pals; our kinswoman, Mrs. E., and her fine daughter, without whom our holiday could not have been half the success it was, and our own family group of four—ten in all.

DINING IN THE HALL WHERE SHEEP STEALERS WERE FORMERLY HUNG

The old house was a dream of interest; its five Tudor gables, quaintly carved, the front stuccoed in a warm cream color, partly covered with climbing jasmine and nodding roses, welcomed us with rare hospitality, as we slipped down the entrance avenue between clipped yews and found ourselves pulling the bell chain at the mailed oak front door (see page 630).

The oldest part of the house, the banqueting hall, was built in 1480, before Columbus sailed west. The dust of centuries has raised the ground level, so that now one must step down to enter. Here the Lord of the Manor was wont to meet with and dine his retainers, fraternize with them at least during the first course, after which he retired to the withdrawing (drawing) room by the stairs under the minstrel gallery (see illustration, page 632). We can fancy meanwhile musicians in their gallery, with drum, fiddle, and pipe, providing music.

In this room justice was administered, and if the finger locks and man-traps, or the gallows, which the present owner demolished a few years ago, were indications, "it" was coming to the offender found guilty. The Lord of the Manor had absolute power over the lives of his retainers, and he was held responsible by his sovereign for their actions. Sheep stealers were summarily hung, sometimes over the beam which now carries the acetylene chandelier.

The younger members of the family looked for ghosts, but the nearest they came to finding them was a dungeon, which Junior discovered.

The modern part of the house was built in the Elizabethan era. The oak floors, highly polished and slippery, are on different levels, indicating various extensions, and one literally has to watch his step. The house contains a wealth of old furniture, books, tapestries, carvings, pictures, and curios. Indeed, we were wont to write our friends that we were living in a British museum.

The staff of inside servants, six in number, were thoroughly efficient and polite. Indeed, the service and table were as good as in any hotel we know. The gardeners were provided in the rent. The climate is highly favorable to vegetation; showers fall about every ten minutes! In Reading I noted the bronze statue of a member of a well-known firm of biscuit manufacturers, represented in frock coat, top hat, and with an umbrella under his arm.

The Manor gardens occupied, perhaps, 20 acres and were laid out with rare skill, and while not kept up to perfection, they were a continual joy.

Through a pergola, passing a fountain, under giant trees, we enter the wilderness garden, a tangle of beautiful shrubbery,

Photograph from George Alden Sanford

THE MANOR HOUSE OF SUTTON COURTENAY IS BOUND UP WITH MORE THAN FOUR CENTURIES OF HISTORY

Glimpsed through a series of pillared gateways, or from the long, cottage-lined village street running inland from the Thames, this five-gabled architectural achievement leaves an enduring impression on the memory. The Manor was formerly attached to the Abbey of Abingdon, two and a half miles to the north, and was a hospital for the monks in the days of Edward III. The sundial in the foreground is attributed to Inigo Jones,

Photograph from George Alden Sanford

THE "WITHDRAWING" ROOM OF THE LORD OF THE MANOR IS NOW AN EVENING RENDEZVOUS

After he had fraternized with his retainers at least during the first course of dinner in the banqueting hall (see page 632), the Lord of the Manor retired to this room by the stairs under the minstrel gallery. Here, also, the modern vacationists congregated of an evening around a piano or exchanged experiences and impressions before a blazing fire.

Photograph from George Alden Sanford

THE BANQUETING HALL AT SUTTON COURTENAY WAS BUILT BEFORE COLUMBUS SAILED WEST

Here the Lord of the Manor met and dined with his retainers, while the musicians in the gallery at the back fiddled, drummed, and piped. This was also a hall of justice, and sheep stealers were sometimes hung from the beam which now holds the chandelier. At the top is the barrack-room window. Under the gallery are stairs leading to the drawing-room (see, also, page 631).

Photograph from George Alden Sanford

THE BEDROOM OF THE MISTRESS OF THE MANOR

through which grass paths lead in and out to beauty spots, heading up to a vantage point where there was a settee—a standing, or rather a sitting, invitation to tarry.

Next came the Italian sunken garden, with statuary, fountain, flowers, and, at a vantage point, the inevitable tea table and settee. The entrance drive came next, between rows of clipped yews flanked by ribbon beds of red and white annuals, all shut off from the gardens by trellises covered by many varieties of clematis.

### IN THE SHADOW OF YEWS 800 YEARS OLD

Down this avenue, between graceful great stone columns, one "pops" into the circle before the house, around an ancient sundial, and is at the front entrance.

Just south of the front door were four enormous yew trees, 800 years old, the owner said. The wide-spreading branches would have been lying on the ground had they not been propped up. Under these trees I could stay indefinitely, studying the birds which gathered to feast on the yellow, waxy, yew berries (see page 634).

Next came the "well" garden, inclosed in a beautiful hedge, with its old Roman marble wellhead. As this was for decoration only, dark red roses were trained over the chains and iron frames.

In this garden many varieties of annuals grew and tile walks led up to the settee. Here blackbirds and thrushes entirely cleaned up our pears in two days.

Through fine old wrought-iron gates we enter the "long" garden, covering, perhaps, three acres. Fantastically clipped yews, classical urns, statues, and a variety of annuals made this the finest of the flower gardens.

From the interior of the Manor House is a vista through the south hall down the length of the long garden, with a circular fountain midway. In late August I counted 79 flower families in bloom here

Through a low arch in the hedge one enters the Persian garden, a formal affair, with fountains and arches in which monthly roses grow between borders of blue mints.

### BOWLING GREEN AND TENNIS COURTS

A fine iron grill leads in to the bowling green, where one of the favorite English lawn games is played. The gardener told me that Sir Francis Drake was playing this game when the approach of the Spanish Armada was reported. "But he stayed to finish the game," the gardener added, "before he attended to the Spaniards."

Next came the lily walk inclosed in

ONE END OF THE LONG GARDEN

Yews fantastically clipped, statues, vases, classical urns, and especially its profusion of annuals, made this three-acre garden a continual source of delight.

Photographs from George Alden Sanford

THESE YEW TREES ARE OLDER THAN MAGNA CHARTA

The wide-spreading branches of these 800-year-old trees are so long and heavy as to touch the ground unless propped up. It was John Evelyn who pointed out the possibilities of the cut and clipped yew for ornamentation purposes, and many grotesque and geometrical forms now adorn English gardens. To Englishmen of old the yew held an important place in folklore, and also provided tough wood for the famous English bow, which overthrew the armored knights of feudalism at Poitiers in 1356.

Photograph from George Alden Sanford

THE IRON SCREEN OF THE BOWLING GREEN

After tea, many an English country gentleman still enjoys his game of bowls. Archery excepted, this is the oldest English outdoor sport which has held a certain degree of popularity since the 13th century.

hornbeam hedges. At the height of the season we could have gathered 500 madonna lilies with plenty left over.

The splendid tennis courts came next. They were always the rendezvous of the young people. The broom walk led up to the Japanese garden, at the head of which was a thatched oak summerhouse. A causeway over a canal from the Thames, a pagoda, and bronze figures were among the attractions of this garden.

Then the river garden, given over to aquatic plants. Next the rose gardens, with perhaps ten thousand blooms when we arrived; indeed, the air was heavy with their perfume.

In the twilight, which meant up until 9:30 p. m., the river was gay with brightly dressed young people in skiffs, canoes, punts, and other craft, some carrying portable phonographs, for "canned" music is a popular feature of river sport. We had our own boathouse and swimming dock. The water of the river is clear and clean.*

Life at the Manor, while not exciting, was delightful. Lovely walks abound and one soon acquires the walking habit. Some of the family walked daily to Abingdon, a most interesting old ecclesiastical town, two and a half miles distant; some to Oxford, eight miles away. Interesting villages lie in almost every direction, and we found the utmost courtesy everywhere.

### RYE AND CANTERBURY ARE LURES

There was Willie, our car, the meter of which showed nearly 4,000 miles on those perfect roads, and their succession of delights, architectural and historical. We joined the pilgrims to go to Canterbury and wended our way there via motor, as would have astonished our predecessors "the knighte, the millere, the reeve, the prioress," *et al.*

If architecture is frozen music, Canterbury Cathedral is a symphony. We love it best of all the English cathedrals.

The towns by the wayside are fascinating. For instance, Rye, left high and dry by the receding sea, itself one of the old Cinque Ports, quaint and medieval. The narrow streets wind up, like threads of a screw, to the summit, where stands the attractive church; angels come out and

* See, also, "Through the Heart of England in a Canadian Canoe," by R. J. Evans, in the NATIONAL GEOGRAPHIC MAGAZINE for May, 1922.

Photograph from George Alden Sanford

FLAMINGOS IN THE RIVER GARDEN

Given over to aquatic plants, the river garden is a unique feature of the 20 acres of gardens surrounding the Manor.

strike the hours, while the long, gilded clock pendulum swings in the open church to remind the people that time flies.

Oxford is a magnet. While its numerous colleges are fascinating, I can only think of those great men who were here trained to make an impact on the world.

We rode to Devon, to Lincoln, to Cornwall—east, west, north, south we went, always reveling in scenery and memories.

In the Dukeries we were fortunate in securing entrée to Clumber House, as the Duke of Newcastle was not then in residence. Our greatest art galleries have nothing finer than the contents of this sumptuous home, much of the furnishings and art the gifts of kings. We incidental travelers were permitted to see and enjoy this wonderful place just because the owner, like many Englishmen, is a man with a democratic heart.

In every city or town there is a War Cross. From the great Cenotaph near Trafalgar Square, in London, where a hundred thousand men pass daily with uncovered heads, to the tiniest hamlet, all have been stricken. In Little Wittenham, a village of a dozen houses, we read on the War Cross, "To the glory of God and in memory of Charles Young, of this village, who died in defense of his country, and to all the soldiers of Great Britain who laid down their lives, this memorial is erected."

In Paddington Station, London, there is a bronze "Tommy" inscribed to the memory of 27,000 employees of the Great Western Railway who fought, more than 10 per cent of whom never came back.

There was London,* a wilderness of interest, only an hour distant by express.

But, like all things, our vacation passed far too quickly and happily away; so let us close this story in the long English twilight, walking through the gardens heavy with perfume. The rooks across the way in the ancient abbey grounds are talking sleepily. The heavy front door is closed, but a pull of the chain gives us admission, and we proceed to the brightly lighted drawing-room with a fire on the hearth, the young people about the grand piano. Thus we love to remember this vacation.

As a matter of mundane interest, I may say that the cost was about seven dollars a day per person, transatlantic crossings not included.

* See, also, "London from a Bus Top," by Herbert Corey, in the NATIONAL GEOGRAPHIC MAGAZINE for May, 1926.

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# SO BIG TEXAS

By Frederick Simpich

Author of "The Great Mississippi Flood of 1927," "Missouri, Mother of the West," "Along Our Side of the Mexican Border," "Singapore, Crossroads of the East," etc., etc., in the National Geographic Magazine

*With Illustrations from Photographs by Clifton Adams, Staff Photographer*

ONCE upon a time Texas was the butt of much crude humor. "If I owned Texas and Hades," General Sheridan was quoted as saying, "I'd rent Texas and move to the other place." Another ancient gibe, thought funny in its day, affirmed that we should chastise Mexico once more and make her take Texas back again.

But modern Texas—big, fat, bluff and breezy—listens with a smile to tales of her turbulent youth. Power and political experience have taught her tolerance. In her easy-going, slightly Mexican manner, she is too busy working out her own social problems and her huge economic destiny to worry over her past, sensational though it may have been.

## A FREE AND INDEPENDENT NATION FOR NINE YEARS

Undeniably, early Texas was turbulent. In a physical sense, also, she was tough. She had to be to conquer, singlehanded, the whole Republic of Mexico when it comprised much of our Southwest and all of California.

Amazing political endurance was also hers. For nine uneasy years she held her own, a free and independent nation. In this period France and England even sent duly accredited representatives to the government of President Sam Houston. Paddling up Buffalo Bayou, wandering overland in oxcarts, these dainty diplomats sought the crude frontier capital. There, donning their plush pants and silver swords, they waded knee-deep in honest Texas mud to the humble "palace" wherein functioned the brawling government of the Lone Star Republic.

Sam Houston, tradition says, received them, clad likewise in the peacock finery of diplomatic dress, and then excused himself to go outside and stop a quarrel between two of his colleagues.

To-day, in odd contrast, France and England again send agents to Texas. But they are plain-clothes trade emissaries, coming to buy that cotton of which she grows from a fifth to a third of the whole world's supply.

And now, instead of log cabins or adobe huts, there are the sky-piercing "cloud-scratchers" of Dallas (see illustration, page 678), a 1,000-room hotel in Houston, and a market service so perfect that a cablegram about cotton has been sent from Texas to Liverpool and a reply received in three minutes.

As for Buffalo Bayou, now it is a great ship canal, deeply dredged, so that ocean steamers dock at Houston, 50 miles inland, as at another Hamburg (see illustration, page 668).

I repeat, time was when Texas *had* to to be tough, physically speaking. In pre-railroad days it took hardy men to drive 10,000,000 cattle "up the trail" to Kansas and Wyoming, swimming rivers, fighting Indians and blizzards, living for months "on the country." Even now a few of

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A TRAGEDY OF THE REPTILIAN WORLD

Here are all the elements of perfect nightmare. A snake sought to swallow a horned toad. But both died. Mexicans say that when a serpent tries to gulp down a horned toad—or even after he has done so—the toad, by twisting its head and using the spines on its neck as knives, can fatally cut the snake. Both these creatures were dead when discovered by the photographer.

THE FRENCH LEGATION IN AUSTIN WHEN TEXAS WAS A NATION

For nine years Texas was a republic, and received envoys from foreign governments. M. de Saligny, diplomatic representative of France, lived in this modest house, built at Austin in 1840, when he was accredited to the Lone Star Government.

AS FROM THE PAGES OF CERVANTES

A daughter of Cortez may listen to the lilting love song "Muñequita," sung by the *charro*, or gentleman cowboy, in tight trousers and bright serape. A garden scene in old "San Antone," where the atmosphere of Spain is still to be found.

Photograph Courtesy First National Pictures

IN OLD BARBED-WIRELESS DAYS COUNTLESS CATTLE PLODDED UP THE TEXAS TRAIL

As late as 1905 about 10,000,000 cattle ranged the Texas plains. Now the bawling, snorting, dirt-pawing longhorn that ran with the wild mustangs—a gaunt, high-speed bovine, hard to fatten—has passed away. In his place has come the straight-backed, white-faced Hereford—tamer, easier to fatten, and heavier in meat. (see "The Taurine World," by Alvin Howard Sanders, in the NATIONAL GEOGRAPHIC MAGAZINE for December, 1925).

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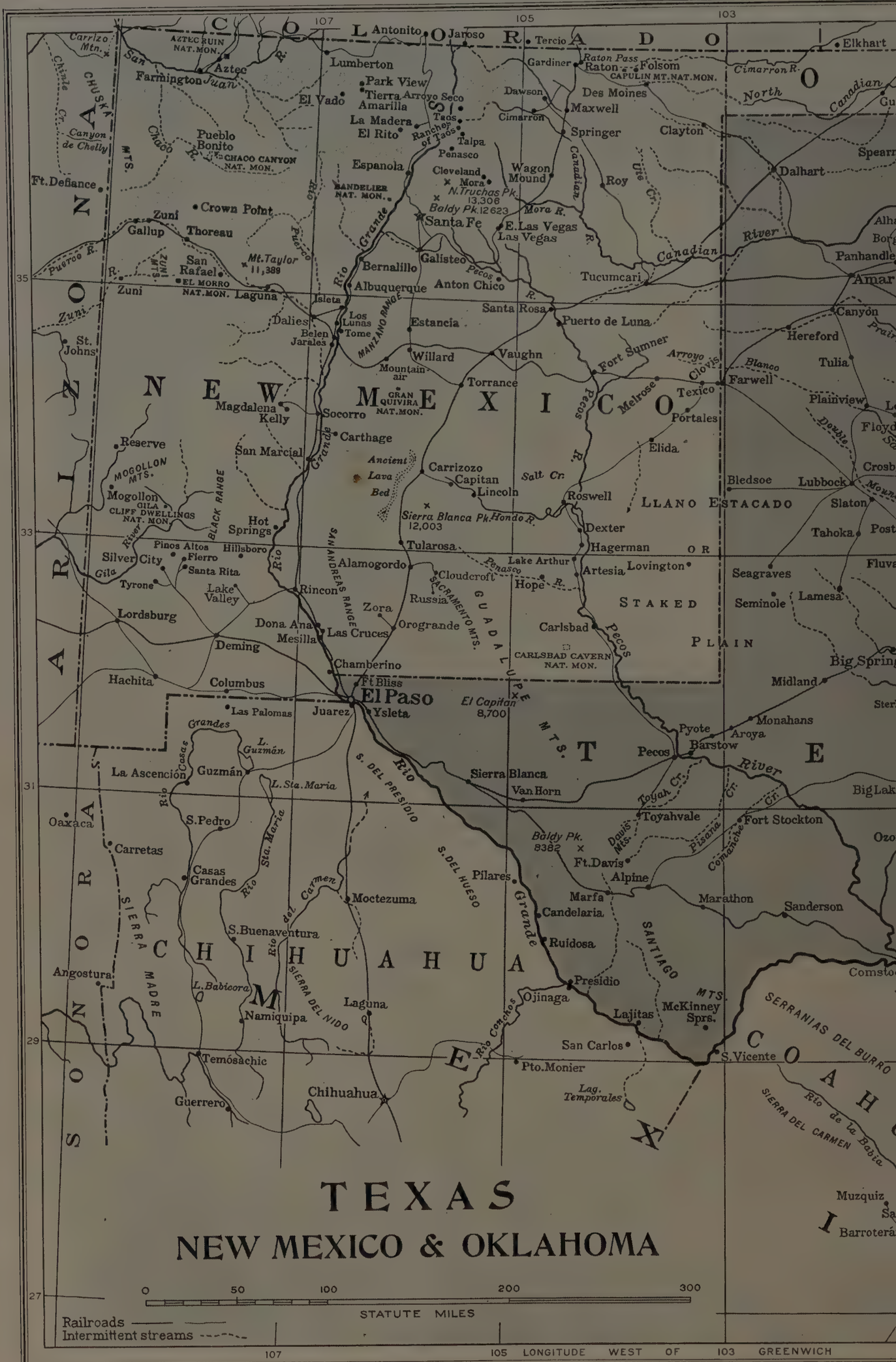
TEXAS CATTLE ON A MEXICO RANGE

Nature designed Mexico as the great cow pasture of North America. Infinite misty blue miles of rolling, grassy plains on the great tableland of Mexico are ideal for cattle grazing, but years of revolution have thinned the herds. At times Mexico has actually had to buy cattle from Texas, and lately Texas ranchers have sent many herds to graze on the fine pastures of Chihuahua.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Intermittent streams
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CHIHUAHUA
SONORA
COAHUILA
LLANO ESTACADO
STAKED PLAIN
Antonito
Jaroso
Tercio
Elkhart
Aztec Ruin Nat. Mon.
Aztec
Farmington
Lumberton
Park View
Tierra Amarilla
Arroyo Seco
El Vado
Taos
La Madera
El Rito
Ranchos de Taos
Talpa
Penasco
Gardiner
Raton Pass
Raton
Folsom
Capulin Mt. Nat. Mon.
Dawson
Des Moines
Maxwell
Cimarron
Springer
Clayton
Cimarron R.
North Canadian
Chaco Canyon Nat. Mon.
Pueblo Bonito
Chaco R.
Chaco Mts.
Canyon de Chelly
Chuska Mts.
Ft. Defiance
Espanola
Cleveland
Mora
Wagon Mound
Roy
Dalhart
Ute Cr.
Canadian R.
Bandelier Nat. Mon.
Rio Grande
N. Truchas Pk. 13,306
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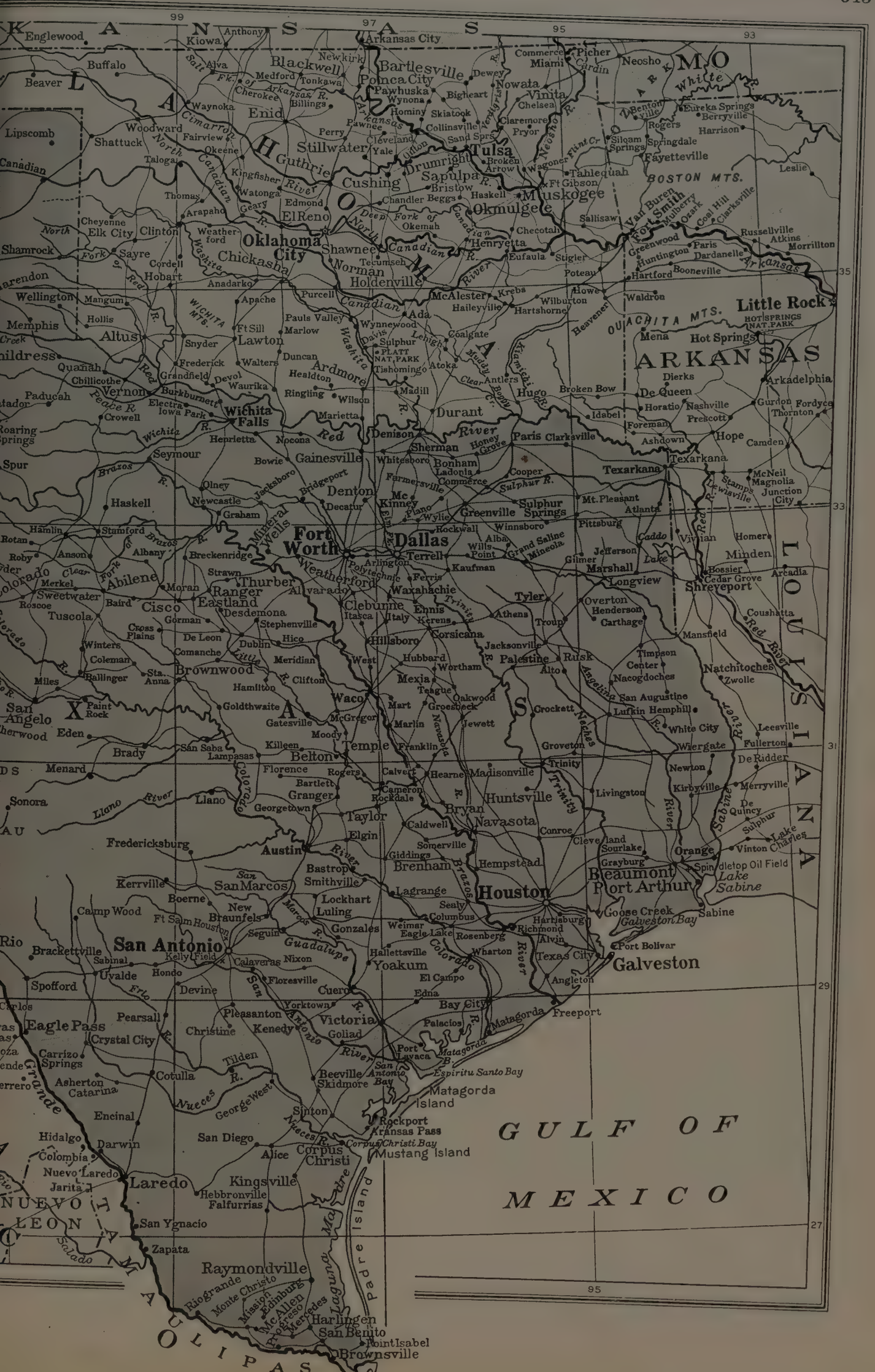
Galisteo
Bernalillo
Albuquerque
Anton Chico
Pecos R.
Tucumcari
Canadian River
Panhandle
Amarillo
Zuni
Laguna
Isleta
Los Lunas
Tome
Belen
Jarales
Dalies
Manzano Range
Estancia
Santa Rosa
Puerto de Luna
Canyon
Hereford
St. Johns
Willard
Vaughn
Mountainair
Torrance
Fort Sumner
Arroyo Blanco
Clovis
Tulia
Farwell
Texico
Melrose
Plainview
Portales
Gran Quivira Nat. Mon.
Magdalena
Kelly
Socorro
Carthage
Reserve
San Marcial
Ancient Lava Bed
Carrizozo
Capitan
Lincoln
Salt Cr.
Elida
Bledsoe
Lubbock
Crosbyton
Slaton
Roswell
Mogollon Mts.
Mogollon
Gila Cliff Dwellings Nat. Mon.
Black Range
Hot Springs
Sierra Blanca Pk. 12,003
Hondo R.
Dexter
Tahoka
Pinos Altos
Hillsboro
Silver City
Fierro
Santa Rita
Gila R.
Tularosa
Hagerman
Lake Arthur
Artesia
Lovington
Seagraves
Tyrone
Alamogordo
Penasco R.
Cloudcroft
Hope
Seminole
Lamesa
Lake Valley
Rincon
Sacramento Mts.
Russia
Zora
Orogrande
Lordsburg
Dona Ana
Mesilla
Las Cruces
Carlsbad
Carlsbad Cavern Nat. Mon.
Pecos R.
Deming
Chamberino
Big Spring
Hachita
Columbus
Ft. Bliss
El Paso
El Capitan 8,700
Guadalupe Mts.
Midland
Las Palomas
Juarez
Ysleta
Monahans
Pyote
Aroya
Barstow
Pecos
Grandes
L. Guzmán
La Ascención
Guzmán
Sierra Blanca
Van Horn
Toyah Cr.
Big Lake
Oaxaca
S. Pedro
L. Sta. Maria
Rio Casas
Rio Sta. Maria
S. del Presidio
Rio Grande
Toyahvale
Fort Stockton
Baldy Pk. 8382
Davis Mts.
Pisana Cr.
Comanche Cr.
Carretas
Ft. Davis
Alpine
Casas Grandes
Pilares
Marfa
Marathon
Sanderson
Moctezuma
Rio del Carmen
S. del Hueso
Candelaria
Ruidosa
Santiago Mts.
S. Buenaventura
Sierra Madre
Angostura
L. Babicora
Sierra del Nido
Presidio
Ojinaga
Namiquipa
Laguna
Lajitas
McKinney Sprs.
Serranias del Burro
San Carlos
S. Vicente
Rio Conchos
Temósachic
Pto. Monier
Sierra del Carmen
Rio de la Babia
Guerrero
Chihuahua
Lag. Temporales
Muzquiz
Barroterán


KANSAS
OKLAHOMA
ARKANSAS
LOUISIANA
GULF OF MEXICO
NUEVO LEON
TAMAULIPAS
Englewood
Kiowa
Anthony
Arkansas City
Buffalo
Beaver
Blackwell
Newkirk
Bartlesville
Ponca City
Pawhuska
Dewey
Nowata
Vinita
Commerce
Picher
Miami
Neosho
Eureka Springs
Berryville
Harrison
Rogers
Bentonville
Waynoka
Enid
Billings
Hominy
Skiatook
Collinsville
Sand Springs
Claremore
Pryor
Chelsea
Siloam Springs
Springdale
Fayetteville
Lipscomb
Woodward
Fairview
Shattuck
Okeene
Perry
Cleveland
Yale
Stillwater
Guthrie
Tulsa
Broken Arrow
Wagoner
Tahlequah
Ft Gibson
Muskogee
Boston Mts.
Leslie
Canadian
Taloga
Kingfisher
Cushing
Drumright
Sapulpa
Bristow
Haskell
Thomas
Watonga
Geary
Edmond
El Reno
Chandler
Beggs
Okmulgee
Arapaho
Cheyenne
Elk City
Clinton
Weatherford
Oklahoma City
Shawnee
Tecumseh
Henryetta
Eufaula
Stigler
Sallisaw
Van Buren
Fort Smith
Mulberry
Ozark
Coal Hill
Clarksville
Greenwood
Huntington
Paris
Dardanelle
Russellville
Atkins
Morrilton
Shamrock
Sayre
Cordell
Chickasha
Norman
Holdenville
Hobart
Anadarko
Hartford
Booneville
Arkansas
Wellington
Mangum
Apache
Purcell
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Kreba
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Wilburton
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Waldron
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Hot Springs Nat. Park
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Burkburnett
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Marietta
Roaring Springs
Crowell
Henrietta
Nocona
Denison
Paris
Clarksville
Ashdown
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Camden
Seymour
Bowie
Gainesville
Whitesboro
Bonham
Sherman
Honey Grove
Texarkana
Spur
Olney
Jacksboro
Bridgeport
Denton
Farmersville
Commerce
Cooper
Ladonia
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Magnolia
Junction City
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Dewitt ville
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Decatur
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Wylie
Greenville
Sulphur Springs
Mt. Pleasant
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Pittsburg
Winnsboro
Hamlin
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Grand Saline
Mineola
Vivian
Caddo Lake
Homer
Minden
Jefferson
Gilmer
Marshall
Longview
Bossier
Cedar Grove
Arcadia
Shreveport
Abilene
Merkel
Sweetwater
Roscoe
Tuscola
Baird
Cisco
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Eastland
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Arlington
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Carthage
Troup
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Kerens
Cleburne
Itasca
Desdemona
Stephenville
Gorman
Cross Plains
De Leon
Dublin
Hico
Hillsboro
Jacksonville
Palestine
Rusk
Alto
Timpson
Center
Nacogdoches
Natchitoches
Zwolle
Mansfield
Coushatta
Red River
Winters
Coleman
Comanche
Little R.
Meridian
West
Hubbard
Wortham
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Teague
Oakwood
Groesbeck
Crockett
Lufkin
Hemphill
San Augustine
White City
Leesville
Fullerton
Brownwood
Ballinger
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Nacogdoches
Angelina R.
Neches R.
Trinity R.
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Paint Rock
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Gatesville
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Newton
Kirbyville
Merryville
De Quincy
Sulphur
Lake Charles
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Menard
Florence
Bartlett
Rogers
Calvert
Hearne
Madisonville
Trinity
Cameron
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Granger
Georgetown
Colorado R.
Llano River
Llano
Sonora
Huntsville
Bryan
Navasota
Caldwell
Taylor
Elgin
Conroe
Cleveland
Sourlake
Livingston
Sabine R.
Orange
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Fredericksburg
Austin
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Giddings
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Grayburg
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Port Arthur
Bastrop
Smithville
Lagrange
Houston
Goose Creek
Galveston Bay
Sabine
Kerrville
San Marcos
Lockhart
Sealy
Columbus
Hartisburg
Richmond
Alvin
Port Bolivar
Boerne
Camp Wood
New Braunfels
Luling
Weimar
Eagle Lake
Rosenberg
Wharton
Texas City
Galveston
Ft Sam Houston
Seguin
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Hallettsville
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El Campo
Angleton
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San Antonio
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Bay City
Spofford
Devine
Yorktown
Victoria
Palacios
Matagorda
Freeport
Pearsall
Pleasanton
Kenedy
Goliad
Port Lavaca
Eagle Pass
Crystal City
Christine
Carrizo Springs
Tilden
Cotulla
Beeville
Skidmore
Espiritu Santo Bay
Matagorda Island
Asherton
Catarina
George West
Sinton
Rockport
Kransas Pass
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Hidalgo
Darwin
San Diego
Alice
Corpus Christi
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Hebbronville
Falfurrias
Padre Island
Laguna Madre
San Ygnacio
Zapata
Raymondville
Rio Grande
Monte Christo
Edinburg
Mission
McAllen
Progreso
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San Benito
Point Isabel
Brownsville
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CRUISING THROUGH COTTON ON THE AFTERDECK OF A BURRO

Without her numerous Mexican population, Texas could not pick her cotton, irrigate her fields, build her roads, or work her sheep and cattle. Because Texas-born Mexicans—sometimes known locally as "Tex-Mex"—are officially listed merely as whites, no one knows just how many of that race live here.

Photograph from Frederick Simpich

FAT, LAZY MULES DEEP IN PECOS COUNTY ALFALFA

From New Mexico across west Texas to the Rio Grande runs the Pecos River valley, a garden spot of singular beauty. The cross-country motorist, his eyes strained and weary from the bright glare of monotonous desert miles, hails with relief the sight of these restful green fields and rustling cottonwoods. Recently an oil field has been developed here.

Official Photograph, U. S. Army Air Corps

"THE DUSTIEST RIVER IN THE WORLD" FLOWS BETWEEN TEXAS AND MEXICO FOR MORE THAN NINE HUNDRED MILES

Through long years of surveys, mappings, and bilingual debate, the Mexican-American Boundary Commission has followed the floods and meanderings of this restless river. Without moving their homes, dwellers along its course have found themselves first in Mexico, then in Texas, then back again, as the channel shifted. In the left foreground is busy El Paso, entrepôt for central Mexico. Across the Rio Grande (upper right) is the bullfighting, casino-loving Mexican city of Juárez, mecca for endless streams of American tourists, who have only to cross a bridge. "Go abroad for six cents" reads the "ad" of an El Paso street-car line. Near the center of Juárez appears a large circle—the bull ring.

these arrow-punctured, bullet-creased old trail riders survive, reminiscently wiggling rheumatic trigger fingers as they tell their little grandsons stirring tales of adventure in old days, "when there wasn't a wire fence in all Texas."

### THE TEXAS OF SONG AND STORY HAS PASSED INTO HISTORY

There was, of course, no sudden, overnight change in the daily life of Texas. Her social, moral, and economic transition covered decades. Yet it is a curious sociological fact that Texas had begun to put her house in order long before many Eastern States responded to similar twinges of conscience. Texas "went dry" in big spots before the national prohibition law was passed. Long years ago she closed her last gambling house. As early as 1883 the Texas Cattlemen's Association adopted a by-law forbidding cowboys to

TEXAS NYMPHS IN PLASTIC POSES

Because half its area is semi-arid, Texas, a farm State, has many water problems. For all uses, it spends $45,000,000 a year on water. From this Catarina bathing pool water is used later for irrigation.

SMUGGLING IS A LIVELY TRADE ALONG THE RIO GRANDE

Drugs, liquors, and aliens all reach the United States illicitly across this shallow stream. These two officers of the American Border Patrol are on the lookout at Smugglers' Bend, near Laredo. Shooting affrays between the patrol and smugglers occur frequently along the border.

Photograph by Duncan

GIVE HIM HIS HEAD AND IT'S ASTONISHING WHERE A HORSE CAN GO

"Letting 'em take it easy," United States cavalrymen descend a steep trail in Presidio County, near the Rio Grande. Dust, squeaking leather, and the tonic smell of horses sweating on hot days—these are memories in old troopers' souls.

Photograph by J. F. Gandara

RECALLING DORÉ'S DRAWINGS FOR DANTE'S INFERNO: TWISTED YUCCAS SPRAWL ON SCORCHING SANDS

LOADING COTTON AT CORPUS CHRISTI, LATEST ADDITION TO THE DEEP-WATER PORTS OF TEXAS

Recent completion of a channel through Corpus Christi Bay makes this port, long popular as a fishing and pleasure resort, easily accessible to large steamers. It also lies on the line of the long Intracoastal Canal, which, when finished, will extend from New Orleans to the mouth of the Rio Grande.

AN OLD-FASHIONED COUNTRY BARBECUE

Beef is being roasted over a pit to regale a picnic party of Texas bankers, near Progreso, on the Rio Grande.

"race horses or fire off pistols indiscriminately around the herds." To-day, playing cards on a Texas train even "for fun" is against the law.

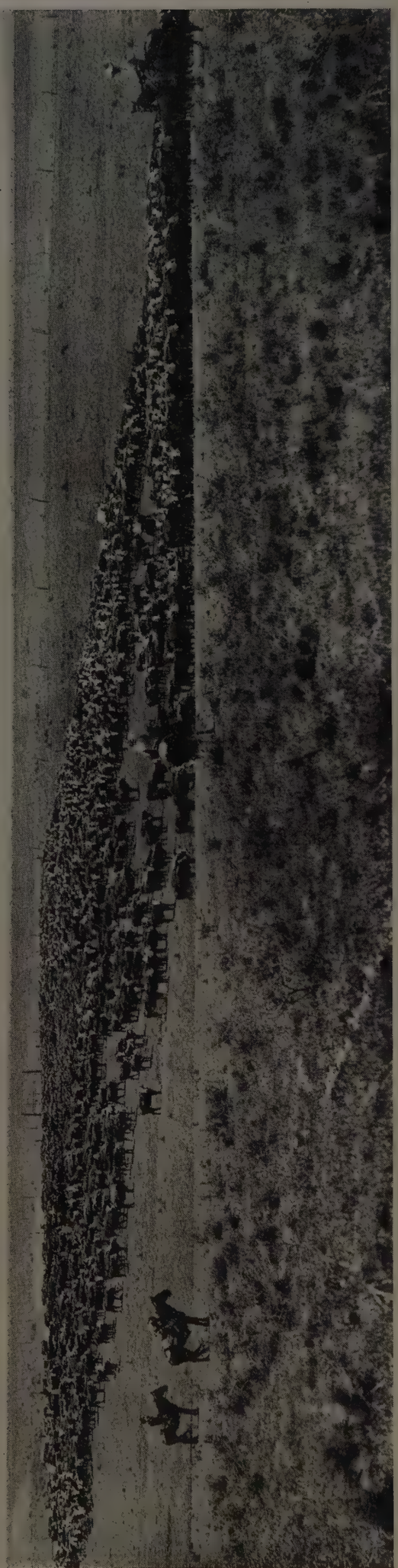
The dust of the plains on the shoes and a big hat are still badges of old-established social position, hinting at kinship with cattle kings. But, except in politics, the tumult and shouting of early days are dead.

### TEXAS IS TRUE TO HER HEROES

Remembering the Alamo is still a popular patriotic pastime. The Alamo and the bigness of Texas are among the first things taught to Texas children. She is true to her heroes. Austin, Nolan, Travis, Davy Crockett, Houston, Bowie, and all the bizarre, romantic figures, the adventurers and swashbucklers whose daring deeds gave vivid color to her history and helped make her a great State, are to Texas what William Tell is to the Swiss or Garibaldi to the Italians.

Though Mexicans are no longer "the chief pursuit of Texas," from the Mexican War down to this minute, the State has had her troubles with Mexicans. At present her trouble is to get enough Mexicans to pick her cotton, work her oil fields, mills, and railway shops, shear goats and sheep, and to gather the long trainloads of fresh vegetables and fruits shipped annually from the lower Rio Grande.

By lawful entry through border immigrant offices and by illegal entry over many a lonely *bosque* trail, tens of thousands of Mexicans march north into Texas every year. Whole areas of the State are



Photograph by Gray

NEARLY 16,000,000 HEAD OF LIVESTOCK LIVE ON TEXAS FARMS AND RANCHES

Trail driving from Texas up to Kansas and beyond continued till about 1885, by which time the expansion of railway service to the north enabled the annual beef crop to be shipped out by train. Later, packing houses were erected in the State. Now a large amount of Texas beef is packed at home.

tinted a rich Aztec brown. El Paso has more than 100,000 inhabitants, half of whom are Mexicans. Farther down the Rio Grande, "dustiest river in the world," often the percentage of Mexicans is even greater.

As in New Mexico, so here in Texas, Mexicans have entered largely into the economic life of the country and, to some extent, into local politics. From the Texas border, also, they have spread as far north as the beet fields of Colorado, the railroad shops of Chicago and Pittsburgh, and even to the fisheries of Alaska.

Here in Texas very often the Mexican immigrant is the chief source of unskilled labor. And it takes a veritable army to do the work of the State, even the railway and shipping work. A million and a half cars of freight, mostly farm products, originated in Texas last year, and her roads hauled, all told, close to 3,500,000 cars of freight across the State.

Galveston, known still to millions of Americans merely as a town that once suffered a frightful tidal wave, is now one of the leading seaports in the whole United States (see pages 667 and 678). Oil pipe lines run down to it and to Houston from as far away as Wyoming!

### ENDLESS DELIGHT FOR THE STATISTICIAN

Texas *is* so big! So big, some one said, that the people of El Paso jeer at those of Galveston as being effete easterners. In terms of people, area, animals, crops, and natural wealth she is so big and her regional interests are so diverse that she has outgrown her very constitution, as a boy outgrows his pants. Laws good for east Texas may be bad for west Texas. State policies agreeable to the natives on the lower Rio Grande may cause

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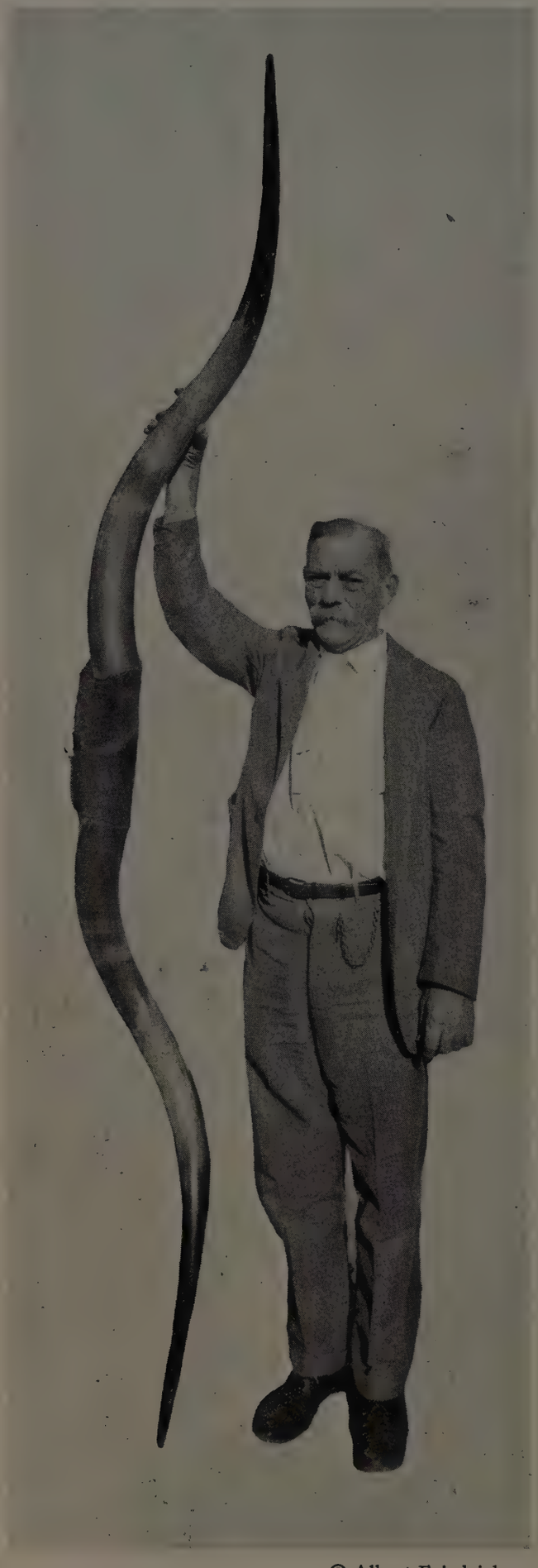
IN THE OLD DAYS, WHEN TEXAS HAD MORE TIME AND LESS GOODS, THESE CARTS WERE USED

Another type of early-day cart had solid wheels made from cross-sections of logs. When heavily loaded and not well greased, these vehicles whine and howl like hyenas. Though they have almost vanished, a few may still be seen along the lower Rio Grande, usually on the Mexican side.



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SUCH HORNS WENT OUT OF STYLE WHEN CATTLE CAME TO RIDE IN CARS

The Texas Longhorn, wearer of such wide-spreading decorations, has disappeared from western ranges.

grief and pain to those hundreds of miles away in the vast Panhandle.

Here in this big Texas that peculiar type of sport-loving near-statistician, who revels recklessly in fantastic figures, finds himself in clover. He has so many millions of everything to add up and make tables about!

### MUNCHAUSEN TALES CONFOUND THE NEWCOMER

Merely to confound the newcomer, the native himself takes delight in repeating Munchausen tales of Texas; or in mentioning casually, for example, that it's farther from El Paso to Beaumont than it is from New York to Chicago. Were Texas as densely settled as Massachusetts, she'd have more than 131,000,000 people.

To population experts, the capacity of Texas for supporting many more people is no new theme. But the map alone is misleading. Many high, dry regions of west Texas will probably remain empty or but scantily peopled for a long, long time. Yet, disregarding these unfriendly areas, no other State holds greater potentiality for future increase in population. And, though not widely advertised, there are winter playground regions in Texas as charming and salubrious as any in America.

That Texas will, in our time, become the objective of a great mass movement of people, as California and Florida have been, seems now unlikely. Texans themselves do not expect it. Yet no one dreamed a few years ago that Florida would so soon see such tremendous immigration. Large movements of people from one map spot to another are social phenomena peculiar to America. Unlike Europeans, we seldom spend our lives where we were born.

When I was a boy in the Middle West, tens of thousands of prosperous farmers, apparently contented, sold out; with money that totaled millions they moved to western Canada. Later, many moved back. At another time many mid-western counties actually lost population when farmers swarmed for the Indian Territory. The human tide to Texas, so far, has been steady, but never in any sense a great migration.

When Stephen F. Austin founded his famous colony on the banks of the Brazos,

Photograph by Jacob Gayer

SUBLIME AND ALONE, ABOVE AN EMPTY, SILENT WORLD

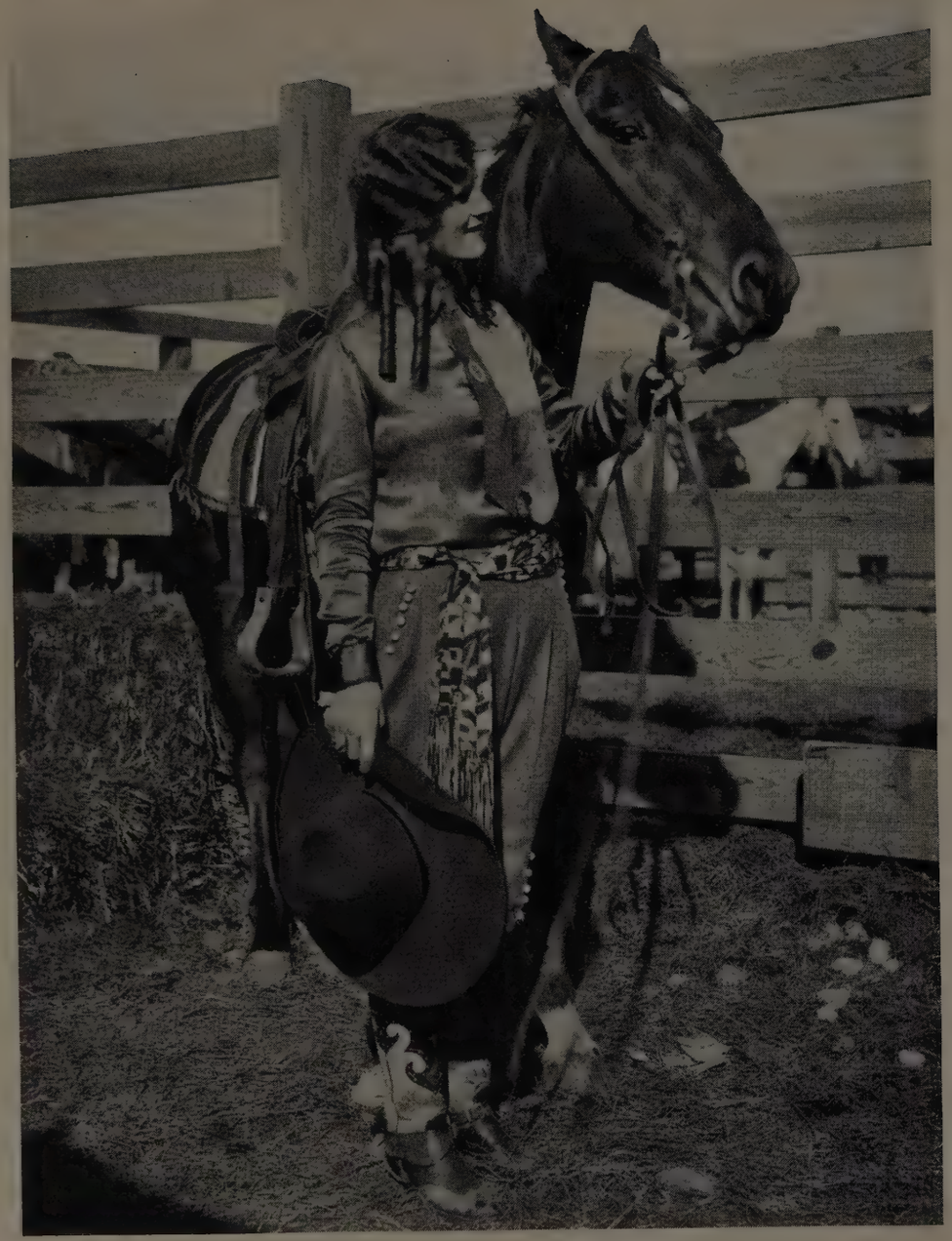
Dry and dead, like burnt-out craters on the moon, certain areas in west Texas are absolutely uninhabited and always will be, even until Judgment Day; for there is no water. From atop this bold Guadalupe peak, northeast of El Paso, one may gaze across miles of desert wilderness.

SEEING SNAKES IN A SAFE, SANE WAY

Man may crush the serpent with his heel, but he saves the hide. Tanned snake skin, sold to the trade at 40 or 50 cents a running foot, is used to make belts, hatbands, purses, and shoes. An "animal farm" near Brownsville, Texas, buys many of its "diamond back" rattlers from Mexico, and

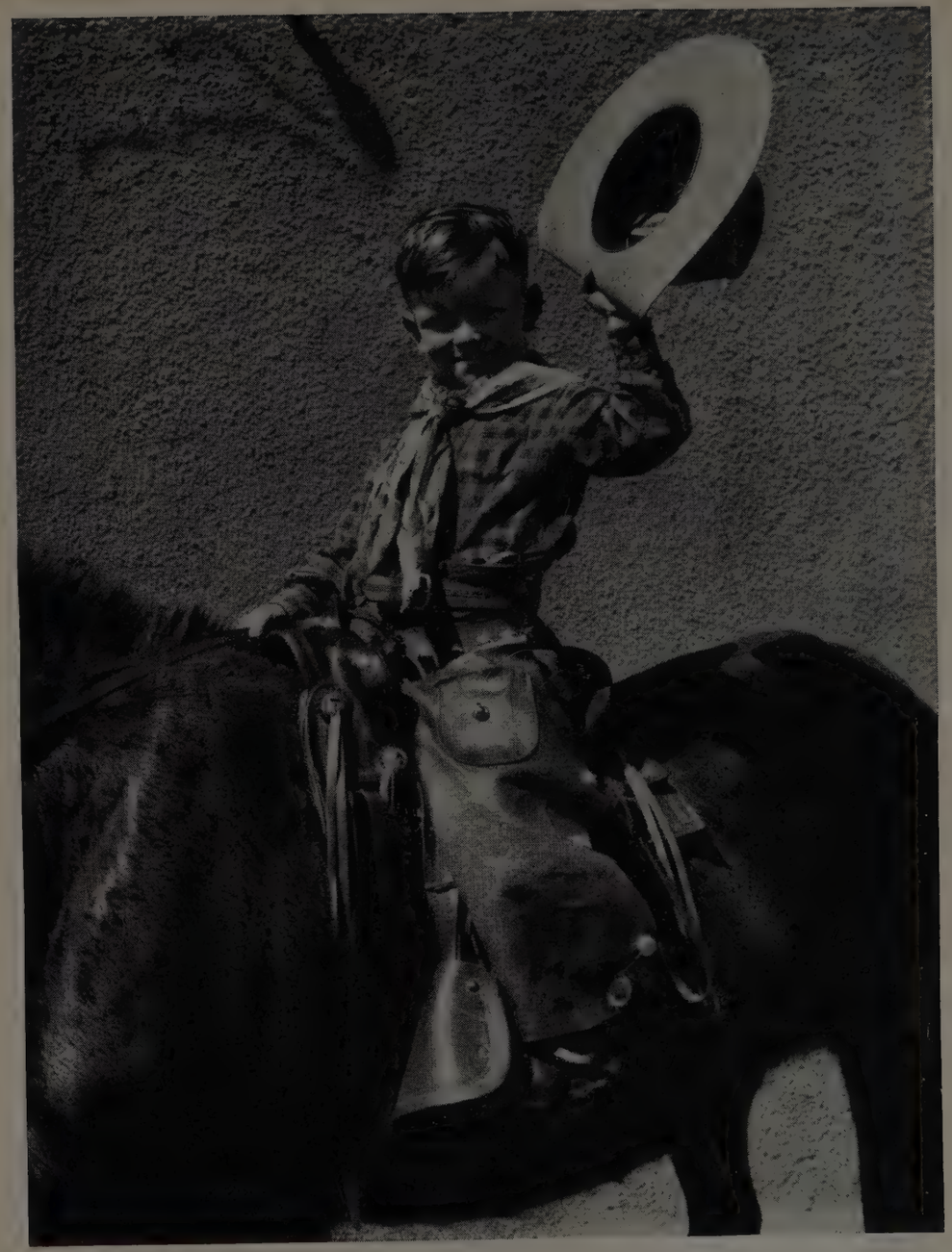
MISS TEXAS TIPS HER HAT

In the popular mind, Texans wear big ten-gallon cowboy hats, "with rims so wide that swallows build mud nests under them, mistaking them for the eaves of a barn." But these light hats, made at Brownsville (see, also, page 661), are much worn along the lower Rio Grande and on the



SHE EARNED HER SPURS

Despite her Wild Bill curls and Dick Turpin air, this trick rider of the rodeo ring is more than a professional cowgirl follower of Wild West shows. She got her training in the hard school of range routine, helping her father punch his own cattle.



HE COULD RIDE ALMOST BEFORE HE LEARNED TO WALK!

"Hello, horse, where are you going with that boy?" is an old West gibe at juvenile riders. This potential recruit for cowboy movies was photographed at a Texas livestock show. From all over the cow country, men and their wives attend these fairs each spring to bid, to buy, and to sell.

Photograph by Duncan

AN AUTHENTIC BIT OF THE OLD, UNSPOILED WEST

There's naught of the dude ranch or moving-picture make-up in this businesslike tableau. Here are *bona fide* cowmen, with saddle horses and pack mules, in the working clothes of their hard calling. The day's ride done, they boil coffee, then roll into blankets wherever night falls.

SINCE MAN FIRST RODE, HE HAS STUDIED AND PERFECTED HIS SADDLE

To the varied and strenuous needs of the cow rancher, whether riding herd, cutting, roping and throwing for branding, or breaking young horses to ride, the stout, heavy Texas saddle is singularly well adapted. With his rope coiled in front, coat and blanket tied behind his saddle, and perhaps a canteen and bit of cold grub, the cowboy is all set for a long ride. At Fort Worth, mecca for cowmen in quest of equipment, such a saddle sells for $125.

Photograph from Frederick Simpich

HOOFS, HORNS, AND TAILS

Beef first made Texas rich. After the Civil War, millions of cattle were driven "up trail" to better range and to market. Transcontinental railroad builders consumed trainloads. A model of the Old Trail Drivers' monument, by Gutzon Borglum, for San Antonio.

HIGH-HEELED, FANCY-TOPPED BOOTS ARE THE COWBOY'S PRIDE

In his hard, rough life, remote from barbers, bathtubs, and haberdashers, the cowboy tickles his vanity with silver-mounted saddle, bridles, fancy spurs, and handmade boots that cost a month's pay. This Texas-made cowman's boot is world-famous. One Fort Worth family which sells its wares as far away as Australia and Argentina has been manufacturing cowboy footwear for nearly half a century.

TEXAS SHRINE: THE ALAMO!

Franciscan monks built this section in 1744 as the chapel of their mission. It is famous now as the citadel of Texas liberty. Within its stone walls James Bowie, David Crockett, William B. Travis, and about 180 other heroes made their last stand against the Mexican general, Santa Anna, with more than 2,500 men. Afterwards, "Remember the Alamo" became the Americans' battle cry against Mexico. To-day the Alamo is used as a museum, exhibiting many old documents, weapons, and other relics of the eventful history of Texas under six flags.

a little more than 100 years ago, the Texas population, including Mexicans and Indians, was probably not more than 8,000 or 10,000. In the next quarter of a century the State had only 100,000 white inhabitants and 35,000 slaves. Not till railways began to spread, in the seventies, was its growth at all rapid. In the last 20 years it has gained more than 2,000,000.

### RAILROADS AID GROWTH OF TEXAS'S POPULATION

From the Middle Western States, since 1920, more than 100,000 people have come each year to settle in Texas. Railway traffic records show this. Of these immigrants, 86 per cent have settled in towns and cities. The remaining 14 per cent, going to the country, have put close to 2,000,000 acres of new land into crops. Since the end of the World War, it is estimated that probably 600,000 people have settled on new farms in the vast Panhandle region.

The enormous agricultural potentiality of Texas is shown by the fact that, although less than half of her arable land has been put under cultivation, yet in a

© J. F. Gandara

WHITE-FACED CATTLE ON A WEST TEXAS RANCH

THE STORY OF THE ECONOMIC GROWTH OF TEXAS IS TOLD BY COW BRANDS

Spaniards first brought cattle to the Southwest. They also first used the riata, and the early vaquero was forerunner of the cowboy. To identify their wandering animals, Spanish ranchers in Texas introduced branding. Each owner used an individual symbol—a character or group of characters. These "irons" were heated and their imprint burned into the skin of an animal's shoulder, flank, or hip. This practice continues. To immortalize the history of the Texas cow business and its importance as the State's original great industry, 32 famous old brands have been chiseled on the walls of Garrison Hall, of the State University. This venerable cow-puncher, visiting a museum, examines an iron he used 40 years ago.

Photograph by Willis T. Lee

SEEKING LOW, EASY LEVELS, RAILWAYS THROUGH TEXAS MISS MANY OF ITS MORE SCENIC REGIONS

Far away on a hazy, purple horizon, as one's train rushes through west Texas, may arise the faint skyline of a rugged world. Close to it train-riders never come, but from El Paso or Marfa, by motor and then horse, one may explore the scenic wonders of this isolated region. The approach to the summit of El Capitan, with salt flats 7,000 feet below.

good year she produces a billion-dollar crop (see illustrations, pages 665, 670, 671, 672, and 673).

These facts, and the undeveloped mineral deposits of the State, must be considered in any speculation as to her future growth.

More than a billion dollars' worth of oil has been produced by Texas in five years and the State probably has more lignite, or brown coal, than the whole famous Ruhr region of Germany. Her deposits run into billions of tons. No one knows how much. Her industrial population, though long of minor consequence, is now increasing fast. Her gross manufactured products for 1927 were valued at more than $1,150,000,000. With her potential farmlands fully cultivated and relative increase in her trade and industries, she could easily support two or three times her present population. To-day her growth, more urban than rural, reveals various towns of from 2,000 to 5,000 people which did not appear at all on the maps of a few years ago.

With her abundant oil, gas, lignite, iron ore, and other minerals, the resulting

A MEXICAN WORKER MAKING PALM-LEAF SOMBREROS

These hats are of native white palm and are beautiful and cool in summer (see, also, page 654).

COWBOYS IN RODEO REGALIA

"The bawl of a steer to a cowboy's ear is music of the sweetest strain;
And the yelping notes of the gray cayotes to him are a glad refrain."

Official Photograph, U. S. Army Air Corps

HOW CAVALRY APPEARS TO AN OBSERVER FROM THE AIR

Fort Bliss, near El Paso, is the largest cavalry post in the United States. Its location on a high, level plateau, in a dry, healthful climate, makes it an ideal ground for year-round mounted drills and maneuvers. For many years the majority of Uncle Sam's troopers have been stationed near the

IN FIESTA GARB

A hundred years ago, when San Antonio was almost entirely Spanish and Mexican, señoritas flirted their fans and cast devastating glances at the swains who "played the bear" outside iron-barred windows.

A SO-BIG PECAN TREE

This "old timer," one in a grove of wild trees growing at Barton Springs, near Austin, is ten feet in circumference. The pecan-nut industry in Texas is about 20 years old. The pecan is the Texas State tree.

WEALTH AND LEISURE BRING CULTURE TO ONCE TURBULENT TEXAS

From this vast and long empty wilderness, generations of hard-working pioneers have evolved a magnificent commonwealth, powerful now, and rich in oil, cattle, cotton, fruits, and vegetables. Schools and colleges rise where once swept only the uninhabited plains, and now the pen is above the pistol. A spring day at Rice Institute, in Houston, where 1,200 young people get free tuition in art, literature, science, and architecture under the will of a pioneer who got rich in Texas and endowed the school.

gradual increase of trade and industry is bound to bring substantial growth to certain Texas cities.

### EAST TEXAS IS A STRATEGIC MAP SPOT

On the maps of the United States used by the General Staff at Washington certain little flags are flying. They indicate the strategic cities of America, such as New York, Chicago, San Francisco, and San Antonio, Texas. Besides its place on the map, among the things which give a city strategic importance are safe and adequate food and fuel, in easy reach, and ample transport. In these respects San Antonio, as well as Houston and Dallas, is well supplied.

Consider Chicago. In the middle of what is probably the largest area of productive land in the world, it is a fine example of a strategic city. "Chicago is destined to be the largest city in the world," the late Daniel H. Burnham, famous city planner, was quoted as saying; yet in 1870 Chicago had less than 300,000 inhabitants.

Likewise, Los Angeles in the eighties was a tiny tamale town, and it took more than climate and fruit really to make Los Angeles a city. It took oil—plus other things.

To a singular degree, then, east Texas, with her oil, lignite, and other minerals, her lumber, her excellent means of transport, and her easy access to vast meat,

THE SIZE OF A MAN'S HOUSE IS NO MEASURE OF HIS GENIUS

This modest dwelling in Austin was, during several years of his literary life, the home of O. Henry (William Sydney Porter), master of the American short story.

IN GOOD YEARS TEXAS GROWS MORE THAN 500 CARLOADS OF PECANS

Most of the big pecan crop comes from wild trees, for the heart of this American nut belt is in the river valleys of Texas. Close to 2,400,000 pecan trees grow in the State. Few of the planted groves are yet in bearing. Science, in late years, has developed a tree yielding large "paper-shell" nuts that sell for as much as a dollar a pound. Last year one Travis County tree produced more than 100 pounds of pecans.

TO PAY FOR ITS CAPITOL, TEXAS GAVE THE BUILDERS 3,000,000 ACRES OF STATE LANDS

Facing the business district of Austin, the Texas Capitol, built of native pink granite, is second in size only to the National Capitol at Washington. Texas, on entering the Union, retained title to her public domain. The present-day estimate of the value of the area paid to the Capitol builders is $60,000,000.

Photograph by Maurer

GALVESTON, SEASHORE PLAYGROUND OF TEXAS, DRAWS VISITORS FROM ALL OVER THE MIDDLE WEST

Standing on an island, with a deep, sheltered harbor between it and the mainland, Galveston is one of the most conveniently situated seaports in America. The value of the 1927 exports for the Galveston customs district exceeded half a billion dollars (see, also, page 678).

HER STRATEGIC SPOT ON THE MAP BODES FOR HOUSTON A MAGNIFICENT DESTINY

Tied to Mexico, the West, and the Mississippi Valley by 17 railroads; served from the sea by numerous steamship and tanker lines through its new ship canal, and bound by pipe lines to oil fields as far away as Wyoming, Houston is inevitably a Chicago of the Southwest. Here, in 1928, is being held the National Democratic Convention (see, also, text, page 672).

FOR NEARLY 400 SCENIC MILES TEXAS TOUCHES THE GULF OF MEXICO

Through tempestuous years, from the days of the Spanish explorer Cabeza de Vaca and Lafitte the Pirate, down to the stirring annals of the Mexican and Civil Wars, the great Galveston tidal wave and the State's enormous present-day foreign trade in oil, cotton, and grain, Texas has claimed kinship with the sea. Yet, so big is Texas that ranchers on her western steppes are farther from the ocean than are many people residing in Indiana.

© Artcraft

HARVESTING RICE IN TEXAS

As early as 2800 B. C. China observed a ceremony in which the Emperor sowed rice. Indigenous to India and tropical Australia, rice long ago crossed the sea and became the staple food of millions. In the muddy rice fields of the Texas Gulf coast, where tractors would bog down, horses and mules are used.

Photograph by Duncan

AN ORCHARD IN THE WEST TEXAS HILLS

Peaceful, happy homes now rise where once Indians menaced the lives of settlers. At the foot of the mountains in the background still stand the adobe ruins of old Fort Davis, an important United States Army cavalry post in the turbulent days when a gun was part of every man's dress, and nobody's life was safe.

Photograph by Archer

RICH SOIL AND RARE FROSTS MAKE PARTS OF TEXAS A TRUCK FARMER'S PARADISE

Amazing indeed is the rapid growth of commercial gardening in Texas. Early spring gives it the benefit of highest prices. Vegetables are handled by the trainload—in one year, 107,000 tons of cabbage, more than 3,000,000 bushels of Bermuda onions, and astounding avalanches of potatoes, lettuce, spinach, beans, berries, peas, beets, together with 125,000,000 pounds of peanuts! Last year, 133,000 acres were planted in sweet potatoes. Practically this whole huge crop is sold fresh, for Texas has few canneries or preserving plants.

grain and natural gas supplies, is a strategic map spot whereon it is easy to visualize a great southwestern city.

### THE LONGHORN LAID FOUNDATIONS FOR FORTUNES AND FARMS

Already Houston is conspicuous. It is the greatest spot-cotton market in the world. On its ship canal it has huge storage for export oil and grain—grain sent from Iowa, Kansas, and Nebraska for Liverpool and Europe. Fed by 17 railways and served by numerous steamship and tanker lines, it trades with the world. Its destiny is one of large possibilities.

In all the kaleidoscopic industrial transitions that are sweeping so much of our South and West, nothing has changed more completely than the Texas cattle ranches (see pages 640, 641).

To-day the original high-speed Texas longhorn, that streak of hoofs, horns, and yellow hide that used to run with the deer and wild mustangs, is practically extinct. Yet, in his time, he was the basis of vast fortunes.

IN A TEXAS ONION FIELD

Into the "winter garden" region about Laredo are coming settlers from all over the Middle West. Here Bermuda onions are grown by the trainload. These Mexican girls are hoeing onions near Catarina, a bustling Texas town only three years old.

THIS ANGORA GOAT "CLIP" WON THE PRIZE AT A TEXAS FAIR

Back in 1849 the first Angora goats were brought to the United States from Turkey. They were a gift from the Sultan and were taken first to South Carolina. To-day in Texas the raising of Angora goats for their mohair clip, of which each animal yields from three to eight pounds, has become a very profitable industry, with a production in 1927 of more than eleven million pounds.

SAN ANTONIO GIVES BATS FREE LODGINGS

Bats eat mosquitoes; so San Antonio provides these bathouses, from whose slat-shaded windows thousands of bats flutter at dusk, on mosquito hunts. At dawn they fly back, to sleep by day in their dark retreat. Bat guano is also collected from these houses.

WILD DESERT PLANTS ADORN MANY FORMAL GARDENS IN TEXAS

A "Spanish Dagger" of the Yucca family (see, also, illustration, page 648), in bloom on the grounds of the Elizabet Ney Studio at Austin. This studio, once the home of a famous sculptress, is a mecca for art lovers in Texas.

Photograph by Aultman and Dorman

THE GREEDY GOAT THRIVES AND MULTIPLIES ON SCANT FEED WHERE CATTLE WOULD STARVE

The daring digestive feats of this capricious creature—ranging from tin cans to old shirts and waste paper—have long been a favorite theme of low comedy. To-day the drier, rougher parts of Texas support thousands of bleating flocks, often tended by Mexican boys.

ROBINSON CRUSOE COULD ONLY DREAM OF A GROUP LIKE THIS

Though minus her classic pipes and garbed in unromantic knickers, a modern Texas nymph of Pan cares for her pedigreed Swiss Toggenburg kids on a model goat farm near Fort Worth. That philandering sycophant, the fickle, ubiquitous goat, thrives on the rough forage of Texas. Goat's milk for use in nurseries and hospitals is in great demand and retails for 40 cents a quart.

When Texas, in the seventies, began shipping meat to London and underselling European producers, even Parliament took notice of the Texas steer and sent official missions to run after him and study him. Then titled plutocrats came, bought ranches, and herded longhorns. Writing about this longhorn, J. Frank Dobie says:

"Financially, the longhorns saved Texas during the dark days that followed the Civil War. They restored the credit of a bankrupt land and they laid the foundations for fortunes and farms, the value of which to-day is hardly to be estimated.

"The Texas longhorn not only saved Texas from financial ruin, but went far toward redeeming from the wilderness vast territories of the Northwest. Somebody has said that civilization follows the plow. West of the Missouri the plow followed the cowboy, and the cowboy followed a longhorn from Texas. Those were the days when Texas men called themselves and were called 'longhorns.' They were proud of the name, and they spoke with contempt of that class of men called 'shorthorns.'"

With the banished longhorn there also passed from this wild-cattle arena most of those rollicking, hard-riding, quick-shooting heroes whose names still live in the old cowboy ballads.

Photograph by Trost

A WHALE OF A STORY FROM THE BALMY GULF COAST

This 50-ton leviathan grounded near the great oil-shipping city of Port Arthur. With ropes, men in a launch tried to tow it up a canal; but it broke loose and started to sea, only to kill itself in collision with a jetty.

Photograph by Underwood & Underwood

A ROAD RUNNER TEASING A RATTLESNAKE

Every man who knows the Southwest is familiar with the shy, long-tailed chaparral cock, or "road runner," and his swift but odd, loping wabble. If while running he wants to stop quickly, he sticks his long tail straight up and brakes with it against the wind. His diet includes lizards, beetles, and small snakes. The belief is common that he kills rattlers, but investigators say, "Not proven."

AS A GREAT DISTRIBUTING CENTER FOR THE SOUTHWEST, DALLAS RELIEVES THE TRAFFIC STRAIN ON ST. LOUIS AND KANSAS CITY

Here literally scores of nationally known business enterprises have built warehouses. On busy days, over 200 package cars of goods leave Dallas for 11,000,000 consumers who live within a radius of 300 miles. This recently completed viaduct is more than a mile long.

BEAUTY AND FASHION PARADE IN SAFETY BEHIND GALVESTON'S SEA WALL

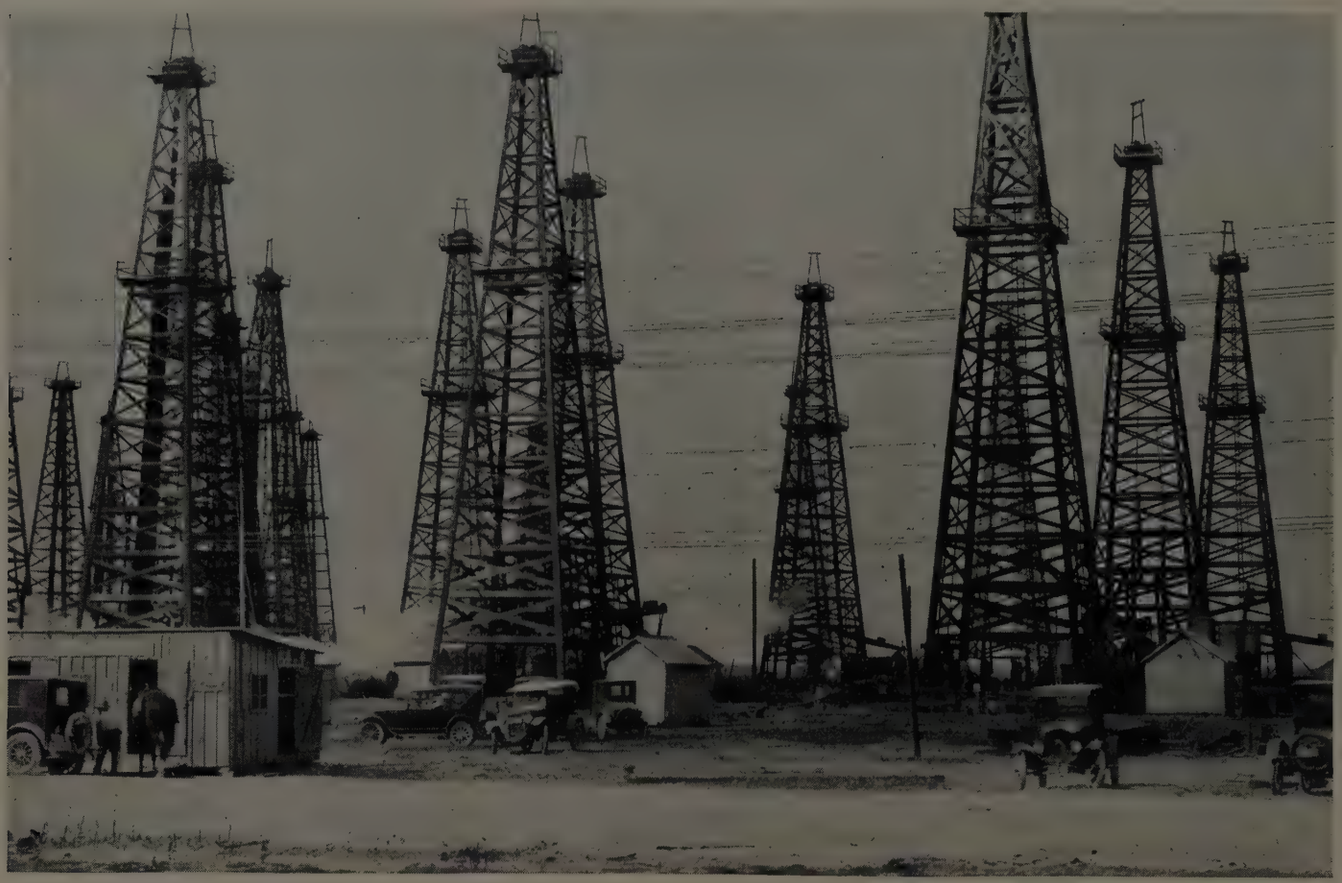
From that black September of 1900, when hurricane and tidal wave spread destruction, Spartan-hearted Galveston, phœnixlike, rose anew from

MOTHER EARTH SNORTS SMOKE AND FIRE: A BURNING OIL WELL

Last year Texas produced nearly 214,000,000 barrels of oil, more than one-sixth of the estimated production for the entire world. The value of this production has not been estimated, but the State's smaller oil flow in 1926 was worth $308,700,000.

A MEXICAN WEAVER OF SERAPES AT HIS LOOM IN EL PASO

Forgotten Aztec artists designed these patterns when Mexico was a center of pagan culture in the Western World. Now, in weaving, in painting, ceramics, and design, modern Mexicans seek to revive ancient Indian arts.



SOME OF THESE OIL WELLS AT SPINDLETOP ARE NEARLY 5,000 FEET DEEP

With a new Texas field found almost every year, the State's oil production tends to overtake the cotton crop in value. In 1927 Texas produced more oil than the entire United States produced in any year prior to 1912.

Photographs courtesy U. S. Bureau of Mines

TWELVE TANK CARS OF TEXAS HELIUM GAS FILL THE DIRIGIBLE "LOS ANGELES"

When chemistry, experimenting in laboratories, first made helium gas by breaking down uranium ores, it cost $1,500 to $2,200 a cubic foot. Now, at a Fort Worth extracting plant, helium is taken from natural gas for about three cents! The helium in these cylinders is under a pressure of 2,000 pounds per square inch.

THE BLUEBONNET IS QUEEN OF THE TEXAS FLORAL EMPIRE

Chosen by the Legislature as the State flower, the bluebonnet rules a range more limited than do most State flowers. The Texas plant blooms in spring over a large part of the State and transforms many a sandy waste into an oasis of color.

Photograph by Captain R. W. Mackie

OCEAN LINERS USE THE NEW SHIP CANAL UP TO HOUSTON

In her magic transit from village to city, Houston outgrew the bayou that formed her path to salt water; so she dug her way to sea. Up through this man-made channel and into her big turning basin come now the ships that shuttle the world's trade. The canal is 25 miles long and has a depth of 30 feet.

"TAPESTRY IN STONE"

An exquisitely carved window flowers from the ruins of the Mission San José de Aguayo, four miles south of San Antonio. Like the mission's statues and other ornamentation, it was the work of a Spanish sculptor who was sent over by the King of Spain and who spent the best years of his life in beautifying this loveliest of the string of missions extending down the San Antonio River. The window was removed for exhibition in 1904, at the World's Fair in St. Louis, and later restored to its original place.

When barbed wire was invented, romance and adventure died—on the Texas plains. Freedom was no more.

### THE LARGEST NATURAL COW PASTURE IN THE UNITED STATES

Yet, even if the open range is gone, no carnivorous American keen on T-bone and prime ribs au jus need contemplate the necessity of eating reindeer, musk ox, or other meat of the Arctic. For 25 years we've worried about a possible shortage of beef cattle; but somehow they still keep arriving at the stockyards in undiminished millions.

As to Texas, the climatic, geographic, floral fact remains that she is still the biggest natural cow pasture in the United States. At this very minute millions of bulky bovines are quietly feeding and fattening inside the wire fences of Texas (see illustrations, pages 640, 641, 650, and 659).

Bigger and better meat-bearing animals—that is the modern Texas cowman's slogan. Gradually building up the herds—no yearly models but constantly improved. To get a husky, fever-resisting beast for the low coast lands, the canny Texans have crossed their native cattle with the great humpbacked Brahmans of India.* And all through the cow country one sees literally hundreds of thousands of bovine giants, dominated by white-faced Herefords, straight of back and heavy with meat.

In good years the Fort Worth market alone will receive more than 1,000,000 cattle, as well as, perhaps, 1,250,000 calves, sheep, and hogs.

"Since 1920," said the Industrial Commissioner of Fort Worth, "as near as we can ascertain, from 500,000 to 600,000 new settlers have entered west Texas. This doubtless has been the most significant agricultural movement in the country in the past decade. But it is our belief that even if many big cow ranches are being cut up into farms, this will not result in any shrinkage of the cattle business. West Texas will hardly become a one-crop country. Taking their cue from the older settlers, the newcomers are accumulating bunches of livestock."

* See, also, "The Taurine World," by Alvin Howard Sanders, in the NATIONAL GEOGRAPHIC MAGAZINE for December, 1925.

Also, despite the spread of farms, vast areas of Texas are still held in the form of big cow ranches, and probably always will be. Much land is better for this than anything else. "The right side of the soil is on top now," you hear southwest Texans say—meaning that the natural grass is worth more than any farm crop these lands could ever grow if plowed up.

### GRIZZLED VETERANS OF CHAPS AND SADDLES ARE PASSING

Barbed wire, after all, was a necessary evil. But it was hard at first to make the old-time, open-plains cowman believe this. To him the snorting, fighting longhorn was a far better sporting proposition than the sleek, slow steer of to-day, that has to be salted and cuddled, sheltered and doctored.

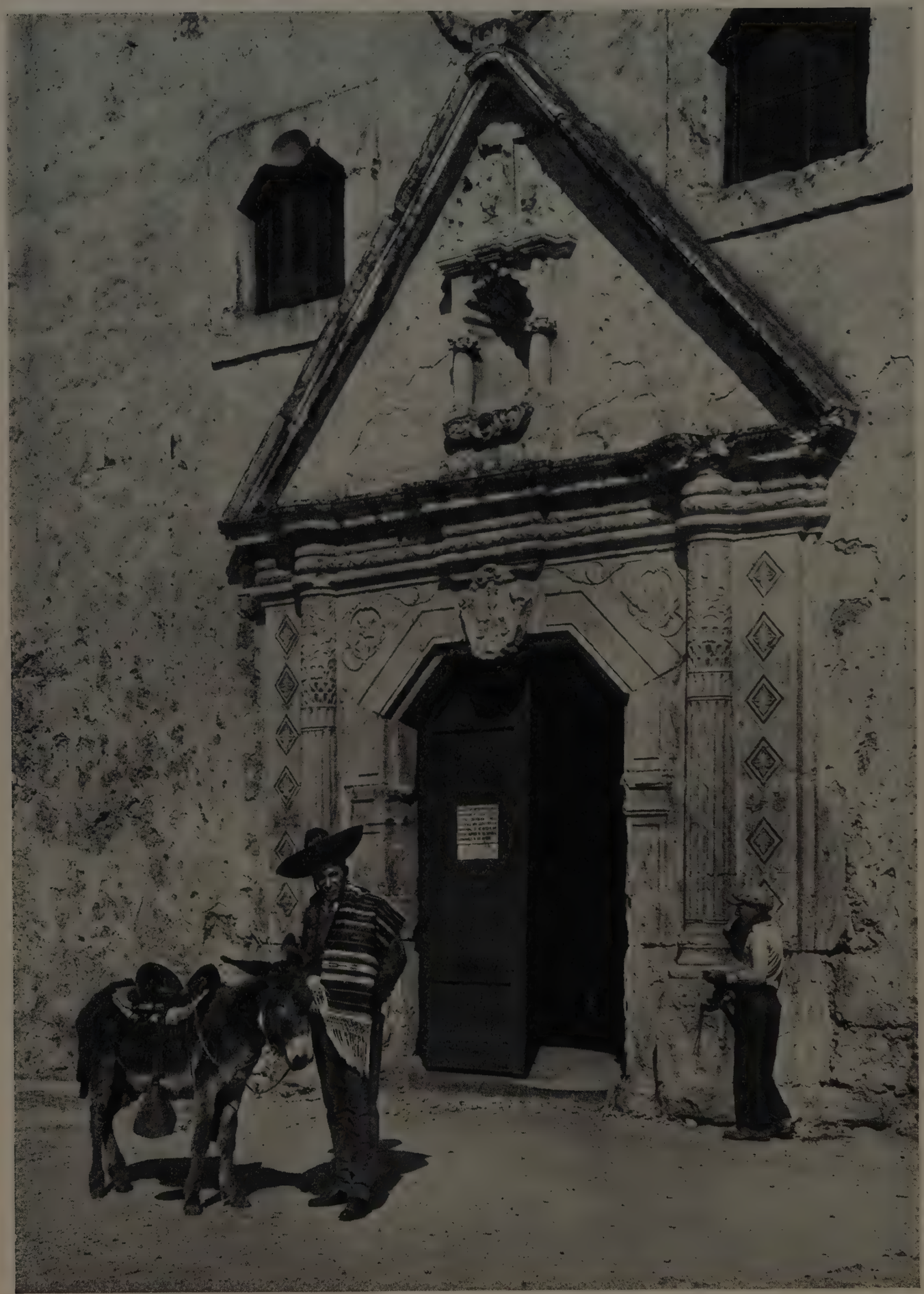
These pioneer cowmen are fast passing. Here and there in the big cow country, the surviving grizzled vets of the chaps and saddles who punched cattle in the eighties hold their noisy reunions, reviving memories of days long ago. They spin yarns of Indian fights and buffalo hunts, of drives up the trail when there wasn't a farmer or a wire fence between the Red River and the Wyoming line, when professional hunters with one-shot Springfields slew buffalo only for their hides and to save grass for cattle.

For these pioneers, some unknown cowboy bard has spun this plaintive ditty:

"Backward, turn backward, oh time on your wheels,
Airplanes, wagons, and automobiles;
Dress me once more in a sombrero that flaps,
Spurs, a flannel shirt, slicker and chaps;
Give me a six-shooter or two in my hand,
And show me a steer to rope and to brand,
Out where the sagebrush is dusty and gray,
Make me a cowboy again just for a day.

"Thunder of hoofs over range as we ride,
Hissing of iron and smoking of hide;
Bellow of cattle and snorting cayuse,
Longhorns from Texas as wild as the deuce,
Midnight stampedes and milling of herds,
Yells from the cowmen, too angry for words;
Right in the midst of it all I would stay,
Make me a cowboy again just for a day."

So, while the nature of the Texas cattle industry has changed, its output in net pounds of meat is still prodigious. In fact, it will probably increase. Following the price slump in 1920 came years of drought. Herds diminished. Now, with



SO MUCH LIKE SPAIN, OR THE DOORWAY OF SOME ANCIENT CHURCH IN MEXICO—YET THIS IS TEXAS

Texas was long a part of Mexico. To this day Mexican influence on its habits of life is plainly visible, especially in the border counties. To its already numerous Mexican population, Texas adds thousands every year, as its growth draws new armies of workers from below the Rio Grande. This is old Concepción Mission, near San Antonio.

SAN ANTONIO ARCHITECTURE, OLD AND NEW, AFFORDS A STRIKING CONTRAST BETWEEN EARLY SPANISH CHURCHES AND MODERN SKYSCRAPERS

At the left of the new office building stands the San Fernando Cathedral, old when Texas was a republic. It served as headquarters for General Santa Anna, before his advance on the Alamo, in March, 1836.

better prices and seasons of ample rain, grass is good and cowmen face a period of reviving prosperity.

Measured in dollars and cents, Texas cotton is above cattle. Cotton, in Texas, is above everything. But nothing is above cattle in the sentiments and memories of Texans. To keep alive and spread the fame of Texas cow kingdoms, 32 historic cattle brands have been carved on the walls of Garrison Hall, newest building on the campus of the State University at Austin.

### COTTON IS KING IN TEXAS

When Cabeza de Vaca crossed Texas in 1535 the Indians gave him garments of cotton. From the few plants of those early days there has developed a production of astounding magnitude. At times Texas's crop has amounted to more than 40 per cent of all cotton grown in the United States. In the record year, 1926, it reached the amazing total of 5,630,831 five-hundred-pound bales.

Weevils have lowered the quality, and bad farming has cut the production per acre; yet, by planting more and more land, the crop has gradually increased. Since 1921 about five and a half million additional acres have been planted to cotton.

In this quest for new land, the State found that cotton would grow on her upper levels, in the higher country of west Texas. Here a most promising area has been found, one that so far is free of weevils, and that also grows the staple

MOST OF THE SULPHUR AMERICA USES COMES FROM TEXAS

By hot water and steam, forced down holes as deep as 1,500 feet, sulphur is melted; then pumped into huge wooden vats at the mines, where it solidifies. For shipment, the sides of the vats are removed, and the sulphur is sometimes blasted to load into railway cars. Ships are loaded by steam shovels from the bins on the docks at Galveston, the chief sulphur port of the United States, which is near the Matagorda and Brazoria County deposits, two of the greatest sulphur-producing fields in the world. Last year America's production of sulphur exceeded 2,000,000 tons, of which Texas supplied practically all. Sulphur now is used in the manufacture of sulphuric acid, matches, gunpowder, and fertilizer.

cotton for which European and other mills are so often asking.

The brain of all Texas throbs day and night on this cotton question. Decades of cotton study have given her a world-wide cotton vision. She is not blinded to the fact that world cotton crops may shift; that some day, so far as her exports to Europe are concerned, her leadership may be challenged. She knows how hard England is seeking to grow cotton somewhere in her colonies for her home spindles, to be less dependent on us; so even a mere rumor that, somewhere in Africa, England's cotton land quest is about to be successful is enough to worry Texas.

"It seems Texas must gradually grow an ever-increasing share of all cotton produced in the United States," said one experienced planter. "And, while weevil-free lands on the upper levels of Texas are a great desideratum, any sudden large expansion would be risky.

"So long as cotton brings $100 a bale or more, the world will keep on planting more and more acres and hunting harder for new cotton areas. So far, Nature somehow has seemed to limit production by local bad seasons and pests. But if we all continue to increase acreage, Nature may some day play a joke on us and yield a world crop so big as to reduce the price to $50 a bale. Then all cotton land values, net revenues, in Texas and everywhere else, would have to be revised."

### A TEXTILE INDUSTRY IS BEING DEVELOPED

Taking a leaf from the book of North Carolina, Texas is beginning to build up her most obvious industry, the cotton mill. She enjoys three of the most vital factors for their profitable operation: adequate labor, cotton "at the gate of the cotton patch," and fuel for power.

Like North Carolina, also, Texas is setting about methodically to make the most

Photograph by Paul Verkin

WITH HUGE STORAGE WAREHOUSES AND QUICK LOADING FACILITIES, GALVESTON HAS BECOME AMERICA'S LARGEST COTTON PORT

of all her natural gifts. The newly formed Society for the Scientific Development of Texas Natural Resources is just what its name implies.

### TEXAS POTASH DEPOSITS MAY FREE UNITED STATES OF FOREIGN MONOPOLY

Vast as many resources of Texas are known to be, further surveys must yet be made to determine the best local industrial use of the many mineral deposits which exist. Already the annual mineral production, exclusive of oil, is valued at $70,000,000.

Take potash. A thorough survey of the Texas deposits may reveal enough of these salts to make the United States forever independent of the present French-German potash monopoly. Often, in drilling for oil and water, high-grade potash is found; but the extent of these deposits remains to be learned.

Texas produces $50,000,000 of net surplus wealth each year. It is the aim of the Scientific Society, by publishing freely the results of its surveys, to aid this home capital in the development of mining and industry.

This development of Texas is not so much a question of outside capital, as it is of assembling data and educating native Texans to put their savings into new local industries.

The bulk of Texas wealth is already owned within the State. Most of her big foreign corporations either operate under Texas charters or else under special State laws designed to protect Texas people. Foreign insurance companies, for example, are required to invest in Texas a large share of their reserves. In many such foreign corporations, especially the public utility companies, Texans already have large holdings.

### A SPAWNING GROUND FOR FARM POLITICS

Texas, never a territory, entered the Union on her own terms. Shrewdly, she kept title to her own public lands. Half this vast domain she gave to her schools. Her university received more than two million acres. Oil found on these lands has made the University of Texas very rich.

Texas, like Iowa, is the spawning ground of farm politics. Here was born

THE SNAP OF A BOWSTRING WAS NO WELCOME SOUND TO TEXANS OF AN OLDER GENERATION

In an archery class at the State University fair co-eds find sport with bow and arrow—a deadly weapon in the days when Texans themselves were its target.

the historic Farmers' Alliance, progenitor of the People's Party. After years of experimenting and disappointment with one or another political panacea, coöperative marketing developed. To-day, especially in the sale of cotton, wool, alfalfa, poultry, and to some extent in livestock, it is increasing fast.

More than two-thirds of all Texas people live in the country. They support nearly 900 papers and magazines. Here the local paper, like the country preacher and the village lawyer, wields a very strong social influence. It is closely read, particularly for farm, livestock, and local political information. You can understand this dependence on the local paper when you stop to think how far many Texas towns are from a city daily. Scores of Texas counties boast no towns of more than 2,500 people.

### COUNTY NAMES IDENTIFIED WITH PIONEERS AND BATTLEFIELDS

Born Texans are pure American folks (such as you still find in east Tennessee and elsewhere in the South). They use many old Anglo-Saxon words and old-style pronunciations. Foreign infiltration, except for Mexicans and a few German colonists, has been small.

Many counties are named after pioneer Americans. There's a Jeff Davis and a Tom Green county, a Jim Wells and a Jim Hogg county, and one named Deaf Smith, in honor of one of Houston's officers in the fight against Santa Anna.

The advent of easterners and middle western hosts has not made much of a change in the original Texan's nature. He's still the bold, self-assertive, independent soul that he was in the days when his ancestors died in the Alamo or helped Houston defeat the Mexicans at San Jacinto.

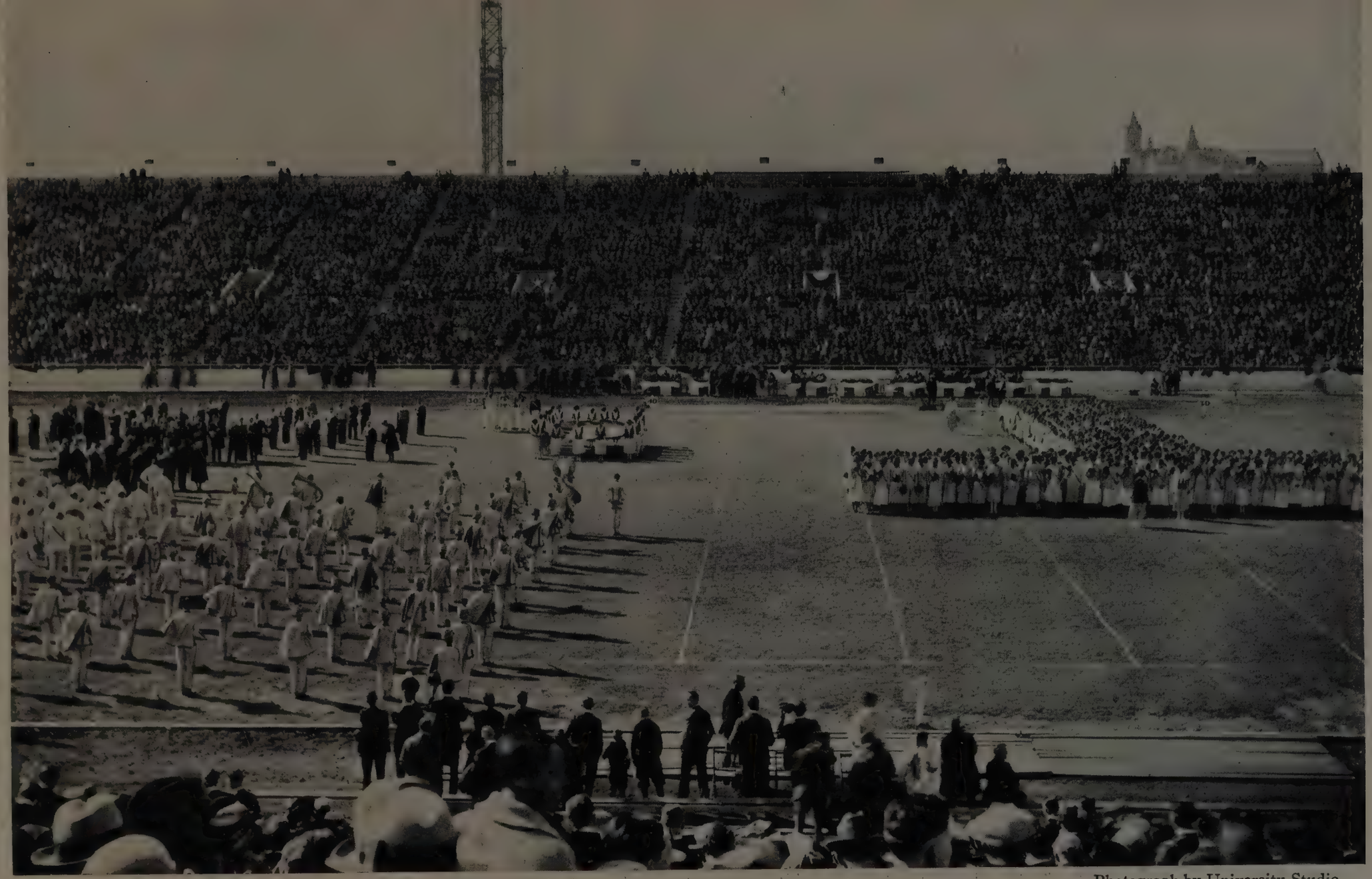
Loyalty to friends is almost a religion. "My father went broke in the cow business—lost a million," a Texas girl told me. "When we were rolling in wealth, I finished in Europe, skated at St. Moritz, got presented at court, and all that. But Texas is home, sweet home, to me. You can lose your money here without losing your friends."

TRADITIONS OF THE STATELY SOUTH LINGER HERE

In the suburbs of Austin stands this fine old mansion, built in 1843, which was once occupied by Elisha M. Pease, twice Governor of Texas. It is one of the best-preserved examples of Southern architecture in the State and furnishes a key to the residential character of the capital, which has always remained a city of homes, churches, and schools, rather than one of shops and factories.

IN ITS EVENTFUL HISTORY, SIX FLAGS HAVE WAVED OVER TEXAS AND ITS CAPITAL HAS BEEN MOVED SEVEN TIMES

When Mexico put off the yoke of Spain, over a century ago, American migration to Texas increased. Following the plan of Moses Austin, his son Stephen, under a permit from Mexico, settled several hundred families on the banks of the Brazos. Austin, the State capital, was named for him. Looking down Congress Avenue, Austin, through an archway in the capitol building (see, also, page 666).



Photograph by University Studio

THE UNIVERSITY OF TEXAS DEDICATES ITS MEMORIAL STADIUM

Approximately $500,000 has been spent to date on this immense structure on the new campus. The part already completed seats 42,000. The university's greatest trouble since it opened, in 1883, has been growing pains, with the student body outstripping the equipment. However, since it "struck oil," the once land-poor institution is looking forward to an income of millions, much of which will be dedicated to a building and expansion program (see text, page 687).

ITS FLEECE WAS BLACK AS COAL!

Because its wool is so fine and curly, the fleece of the young karakul lamb is much used in place of fur. A flock of karakul sheep is being bred in the Rio Grande Valley near El Paso, original rams and ewes having been imported from Bokhara (see "The Land of the Lambskins," by Robert K. Nabours, in the NATIONAL GEOGRAPHIC MAGAZINE for July, 1919).

Hosts of Americans have seen Texas from the windows of transcontinental trains. To such train riders it seems largely a flat, dry, almost treeless country. That's the fault of men who located the railroads. It's the same in Arizona. Railways don't haul you over high, scenic drives, like sight-seeing busses — not if they can help it. They seek the easiest way. In the Southwest this is often over level deserts, over minimum grades, dodging the mountains, with their pine trees and trout streams, whenever they can.

Parts of Texas, like the great barrancas of the Panhandle, or the Santa Helena gorge in Brewster County, are wild and picturesque. Cross-country train trippers killing time at bridge between Kansas City and Los Angeles, see nothing of these rougher, wilder regions. Likewise, by hundreds of miles, they miss the verdant, fruitful, subtropic Gulf coast, with its palms and beaches, its pleasure resorts, and its busy, growing tourist traffic. From all over the Middle West increasing numbers of visitors go now each winter to Galveston, Corpus Christi, and other Gulf towns.

### A GREAT CITRUS-GROWING REGION

Farther south and along the Rio Grande, there is to be had some of the best hunting in the United States.

Here, too, between Laredo and Brownsville, has developed rapidly a vegetable- and citrus-growing region of wealth and importance. Some of the finest grape-fruit grown in the United States come from this particular spot, and the big, sweet Bermuda onions from the Rio Grande Valley have achieved prime place in our markets. Because of climate, soil, ample water, and improved transport, this and other choice parts of Texas will attract more and more settlers as the years pass.

Much of the land of Texas is still priced comparatively low—low enough, in truth, to yield a higher net return than the profits usually earned on similar lands elsewhere; and these land values rise, of course, as inhabitants multiply.

HORSES WERE UNKNOWN IN AMERICA WHEN THE SPANIARDS CAME

Fossilized remains of ancestral horses have been found in the United States, but our equine race of to-day, together with sheep and cattle, came with the Conquistadores. Of late years the Mexican army has bought many mounts in Texas. This herd is drinking near San Angelo.

Superlative Texas! Her governor rules more territory than any king or premier of Europe has in the continental limits of his country, Russia alone excepted. Here native Americans, starting only with hard hands, strong wills, and great energy, have built up a vast, rich, and powerful commonwealth.

Since General Sheridan spoke his mind a wilderness has yielded to civilization. There is no joke, now, about Texas.

*Editor's Note:* It is impossible to present between the covers of a magazine the entire story of a great State. A complete description of the multifold industries, interests, and beauty spots of Texas and of each of her hundreds of progressive cities and towns would require volumes. Therefore, the author has in the preceding pages brought into close focus only a representative group of outstanding facts about this commonwealth.

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# PHOTOGRAPHING THE MARVELS OF THE WEST IN COLORS

By Fred Payne Clatworthy

THIRTY years ago I left Brooklyn Bridge, New York City, on a bicycle trip across the continent. The West, and especially the Southwest, was to me the great unknown. In New York City, from a certain hill, it was claimed, one could see the abode of ten million people; but out west the natives prided themselves on how many miles one could travel in a day without seeing a living soul.

On the plains of New Mexico the bicycle went to pieces; so, catching some half-wild burros, saddling them with panniers made out of grocery boxes, and carrying a Dutch bake-oven, provisions, and cameras, a college friend and I walked a thousand miles to California by way of the Petrified Forest and the Grand Canyon of Arizona.

We had the usual experiences of early-day explorers. Many ranches were deserted, for the country at the time was terrorized by the famous "Black-Jack gang." The first night, on the San Augustine plains, we stopped at a cattle ranch 65 miles from a railroad.

Late at night three horsemen rode in, tired and spattered with mud. They stacked their Winchesters in a corner and demanded something to eat. In accordance with the New Mexico custom, steaks were fried and "air-tights" opened without questions being asked.

The mysterious visitors "hit the trail" early next morning. Later we learned that they were "Black-Jackies" and had that day held up the mail train at Grant Station and killed one of the clerks. When they stopped at the ranch they were on their way to rob the bank at San Marcial. The trio met the swift justice of the good old days: one was lynched in Utah and the other two were guests of honor at an "Arizona necktie party."

But to resume our journey, which is a picture, not a bandit trip.

We passed through the Petrified Forest and crossed part of the Painted Desert on our way to the world's greatest gorge. It was on this trip that I first discovered the matchless colors of the Southwest—America's finest field for color photography. This was before the days of the color plate, and all we could make were black-and-white negatives—quite unsatisfactory in this land of color, where only color can truly interpret it.

The following year another school friend and I drove a team of mules and a spring wagon 1,500 miles, from Los Angeles to the Grand Canyon by way of San Diego, crossing the Colorado Desert, where now is located the rich Imperial Valley. Only the first surveying parties, laying out the future town sites, were there then.

### HARSH INTRODUCTION TO A LAND OF ENCHANTMENT

We were caught in a desert sandstorm, lost our way, and traveled all day by compass across trackless sand wastes, part of the time in old Mexico, camping at night on the mesquite-protected shores of an overflow pond of the Colorado River. We crossed the latter successfully the next day and continued across Arizona to Montezuma's Castle and the Natural Bridge of Tonto Basin.

Roads became so rough in Tonto Basin that we had to abandon the wagon temporarily and ride the mules. A brother of old John Hance, of Canyon fame, with a similar reputation for veracity, told us he had once driven a wagon three miles over this same rocky road before he discovered he had lost one of his wheels!

These cross-country scouting trips constituted my introduction to a land of enchantment. Later I was to come back again and again to paint its colors with a color plate and camera lens.

The Grand Canyon's transparent purples and blues defy the artist's brush; it has remained for the autochrome plate to reproduce its exact colors. What is true of the Grand Canyon is equally true of the Painted Desert, Zion National Park, and Bryce National Monument, "that beautiful garden that blossoms in columns of stone."

On a recent trip I had as my companion a veteran Western painter. Zion he attempted with some success, but when he saw Bryce he would not even unpack his kit; he simply said, "It cannot be done."

Few readers of the many who now, as a matter of course, look for the natural-

© National Geographic Society Natural Color Photograph by Fred Payne Clatworthy

THE GLASS OF FASHION IN HOPI LAND

Few of the North American Indians attained as high a degree of civilization as did the cliff-dwelling tribes of the Southwest. Among these are the Hopi, a peace-loving people who are industrious, quick to learn, and have a well-developed sense of artistry. The blanket, beads, and silver belt worn by this brave are examples of their craftsmanship.

© National Geographic Society

Natural Color Photograph by Fred Payne Clatworthy

ANCIENT EVERGREENS FRAME A GLORIOUS VIEW OF THE GRAND CANYON

Probably the first white men to see the glories of the Grand Canyon were Francisco de Coronado's band of Spanish adventurers, who chanced upon it about the middle of the 16th century while seeking the gold of the Seven Cities of Cíbola.

© National Geographic Society

Natural Color Photograph by Fred Payne Clatworthy

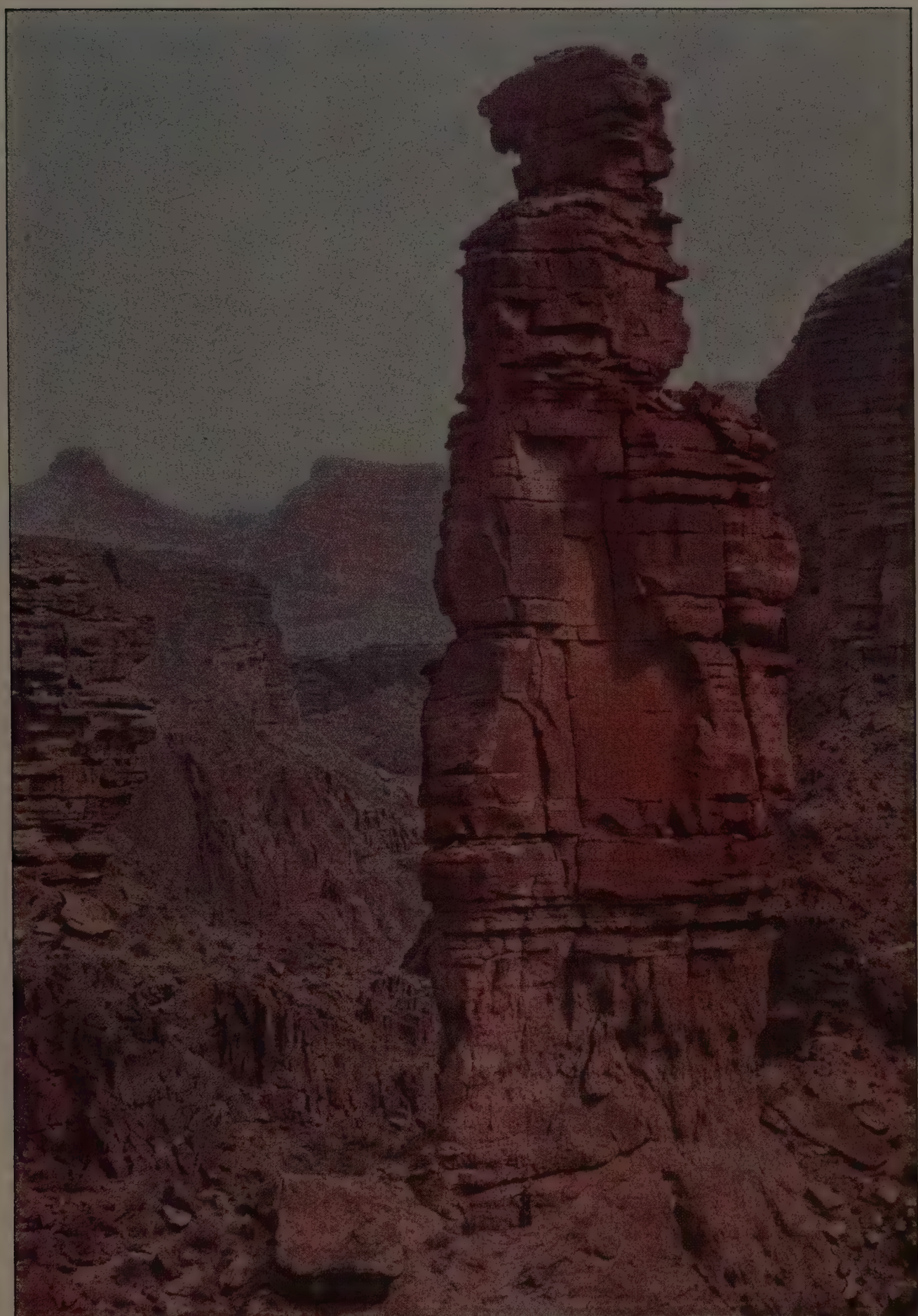
A MASTERPIECE OF THE GREAT ARCHITECT OF CREATION

More than 150,000 visitors come each year to stand in awe at this, one of the Seven Wonders of the Natural World, which has been set aside as a national park. The Grand Canyon is 220 miles long and in places is twelve miles wide at the surface, while the Colorado River, flowing at a depth of more than a mile, averages 300 feet in width. So mild is the climate at the bottom of the canyon that flowers bloom summer and winter.

© National Geographic Society Natural Color Photograph by Fred Payne Clatworthy

WHERE ROCKS AND RIVER HAVE BATTLED THROUGH THE AGES

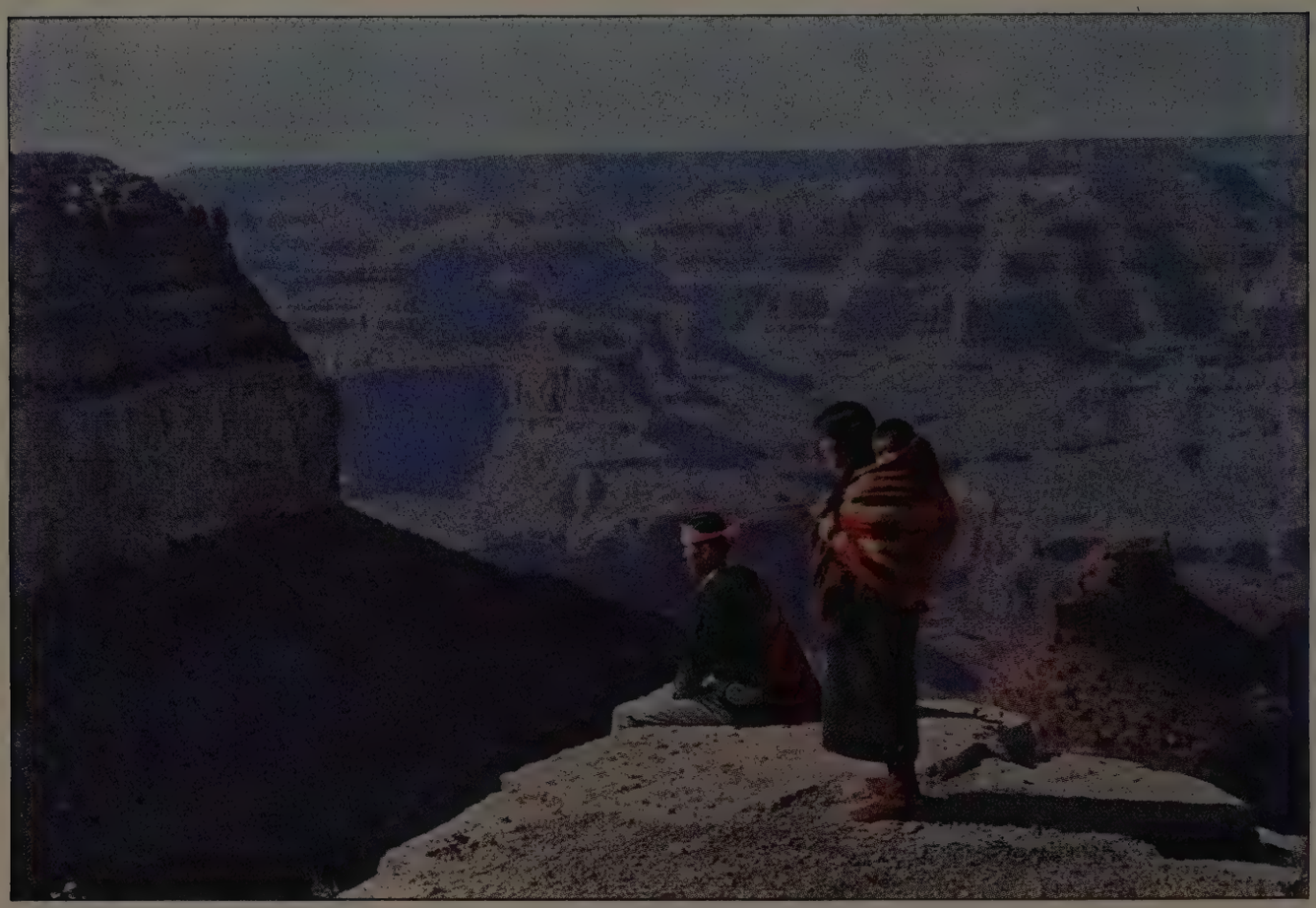
Here the wild waters of the Colorado have carved from the rocks a Cyclopean labyrinth. The river has cut its channel to a depth of nearly 6,000 feet from the Canyon's rim and is still waging its warfare with the Earth's crust.



© National Geographic Society Natural Color Photograph by Fred Payne Clatworthy

MONUMENT ROCK, A TOWERING SENTINEL BESIDE THE TONTO TRAIL

This gigantic finger of red sandstone was fashioned by wind and time's erosion. The Tonto Trail, a byway of the Grand Canyon, winds deviously along its southern cliffs, dipping here and there almost to the level of the river.



WHENCE MAN CAME TO DWELL UPON EARTH

According to Hopi legend, the first human beings arrived from the Underworld by way of the Grand Canyon.

© National Geographic Society Natural Color Photographs by Fred Payne Clatworthy

A SUMMER DAY ON THE CONTINENTAL DIVIDE

Although the picture was taken on June 23, there were still eighteen feet of snow along the sides of this road in Rocky Mountain National Park. Charges of T. N. T. are so placed in autumn that they may be exploded in the spring to loosen the packed snow. Without these explosives and a steam shovel to clear a way, some of the roads would be impassable until late summer.

© National Geographic Society Natural Color Photograph by Fred Payne Clatworthy

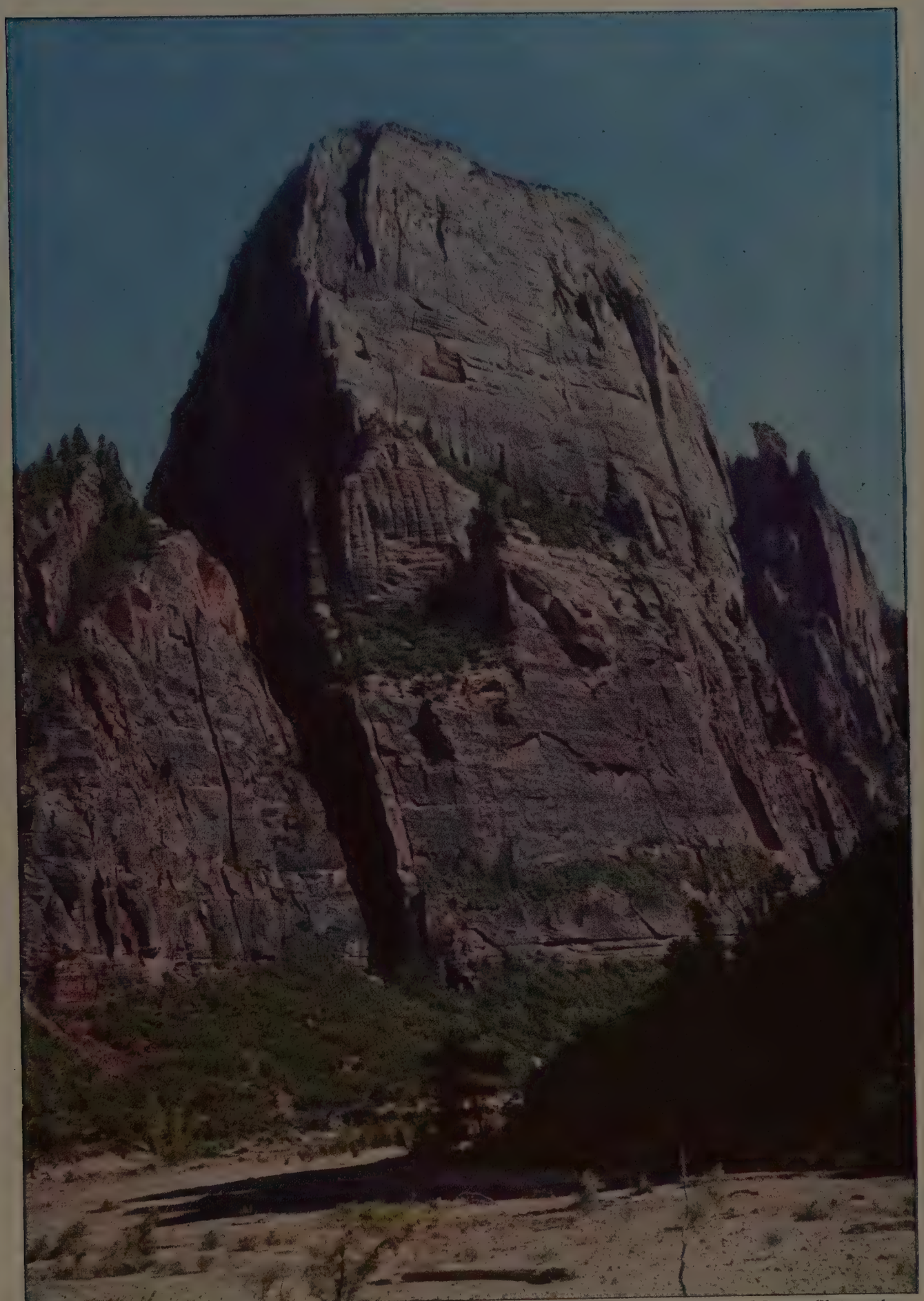
SUMMER FLOWERS ENCROACH ON WINTER'S MELTING SNOWS

More than a thousand varieties of wild flowers lend color to the ledges, slopes and fields of Rocky Mountain National Park, while a few hardy species adorn the tops of the highest peaks. The attractions of the park run the gamut of rugged mountain scenery, forests, canyons, glaciers, lakes, waterfalls and alpine meadows.

© National Geographic Society Natural Color Photograph by Fred Payne Clatworthy

LILY-SPANGLED NYMPH LAKE IS A PRODUCT OF MOUNTAIN GLACIERS

A much-traveled trail leads along this shore to the better known Dream and Emerald Lakes. Hallett Peak, in the background, is one of fifty within the boundaries of the Rocky Mountain National Park which rise to a height of more than 10,000 feet. The park is situated in the very heart of the Rockies, yet is easily accessible both from Denver and Cheyenne.



© National Geographic Society Natural Color Photograph by Fred Payne Clatworthy

THIS MIGHTY MONOLITH REARS ITS MASSIVE BULK 3,000 FEET ABOVE THE VALLEY

The most stupendous spectacle of Zion Canyon is known both as "The Great White Throne" and as "El Gobernador." The upper portion of the vast cone of sandstone is almost white, while the lower sections shade into magnificent pinks and lavenders. So precipitous is its ascent that no human foot has ever been known to tread its timbered summit.

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Natural Color Photograph by Fred Payne Clatworthy

THE SAPPHIRE WATERS OF GRAND LAKE NESTLE HIGH AMONG THE ROCKIES

The largest natural lake in Colorado is associated in Indian tradition with tragedy. According to the story of the Redmen, a party of Utes who made their summer home on these shores long before the white man came, were surprised and massacred by marauding Cheyennes and Arapahoes. Just before the battle all the Ute squaws and papooses were placed on a raft and sent out on the lake for

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Natural Color Photograph by Fred Payne Clatworthy

A NATURAL MIRROR REFLECTS THE LOFTY MASS OF THE ANGELS LANDING

Only slightly less noble in proportion than El Gobernador (see Color Plate IX), the Angels Landing stands where a bend of the Mukuntuweap River provides a still and unruffled backwater to reflect its image. The Indians of this region will not stay in the gorge of the Mukuntuweap (Zion Canyon) at night, as they believe it to be the abode of powerful spirits who would resent such intrusion after dark.

© National Geographic Society

Natural Color Photograph by Fred Payne Clatworthy

IN THE VALLEY OF THE PATRIARCHS

Zion Canyon was named by the Mormons of a former generation, who selected it as a place of possible refuge in the event they should find it necessary to flee from their settlement near the shores of Great Salt Lake. Their religious turn of mind is reflected in many of the place names within the canyon and is probably responsible for the appellation applied to these three peaks—the Patriarchs.

© National Geographic Society

Natural Color Photograph by Fred Payne Clatworthy

ZION PARK LIES LIKE A PALETTE OF BRILLIANT COLORS AMID THE DESERT'S TAWNY SANDS

Improved transportation facilities now make it possible for many thousands of visitors to enjoy this natural art gallery each year. From the west rim of the canyon one may obtain a comprehensive view of the vast "New Jerusalem," with all its inspiring array of courts and columns, towers and thrones.

© National Geographic Society

Natural Color Photograph by Fred Payne Clatworthy

SAN JACINTO'S ICE-CAPPED HEIGHT LOOKS DOWN ON THE DEVIL'S GARDEN

The north side of the 10,805-foot mountain is very steep, rising at one point 4,300 feet in a single mile. A veritable California garden of cacti and other desert plants lies at its base. The tall palmlike plants at the right are yuccas, while in the left foreground are two of the unsavory cholla cactus, with sharp, barbed spines which, according to Indian tradition, the plants can cast at the passer-by.

© National Geographic Society

Natural Color Photograph by Fred Payne Clatworthy

SPRING SPREADS A MANTLE OF BLOSSOMS OVER SOUTHERN CALIFORNIA

The gold which attracts visitors to the Pacific coast to-day is not the same kind that started the rush of the Forty-niners. The modern attraction is a climate which early in spring causes the fields to burst into a kaleidoscope of wild flowers.

FLORAL AMETHYSTS IN A PRICKLY SETTING

The drabness of the desert is dispelled when the cactus blooms, for its flowers rival the orchid in beauty of color and delicacy of texture.

© National Geographic Society Natural Color Photographs by Fred Payne Clatworthy

BLOSSOMS OF THE FAN-LEAF CACTUS REFLECT THE DESERT DAWN

Some of the cacti which are insufficiently protected by the customary spiny armor are so full of tannin that most animals refrain from taking a second nibble.

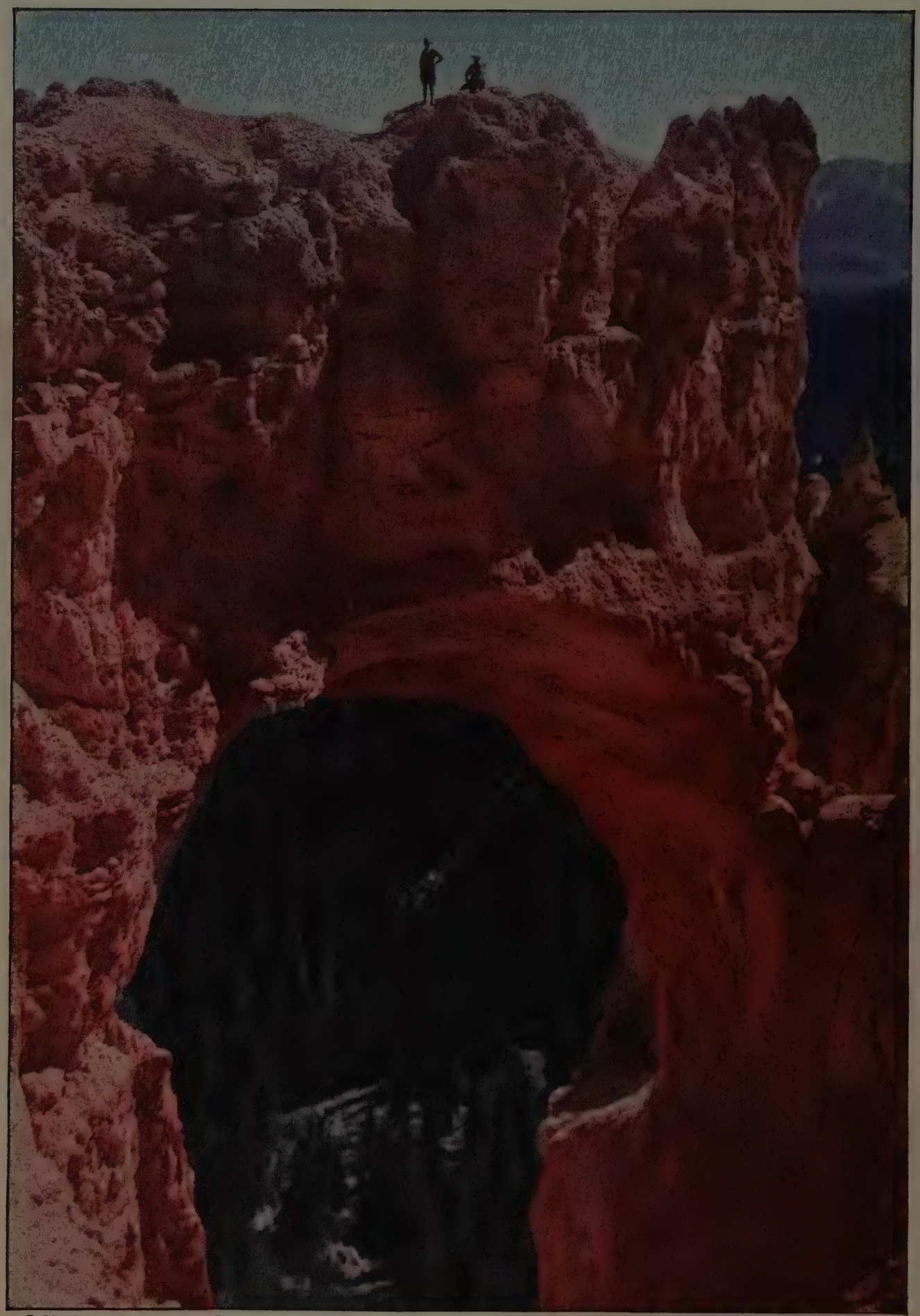
A PORCUPINE'S COUNTERPART IN THE PLANT WORLD

The flowers of the hedgehog cactus are two or three inches long and spring from a cucumberlike stem plentifully besprinkled with spines.

© National Geographic Society Natural Color Photographs by Fred Payne Clatworthy

JEWELS AND THORNS ALIKE ADORN THE DESERT'S CROWN

More than fifty varieties of the prickly pear cactus are found on the American deserts. They are usually distinguished by yellow or orange flowers and long spines.



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A NOBLE SPAN WROUGHT BY WIND AND WATER

The natural bridge some ten miles south of Bryce Canyon, while not the largest in America, can lay legitimate claim to being among the most beautiful in color. Its arch is approximately 100 feet high.

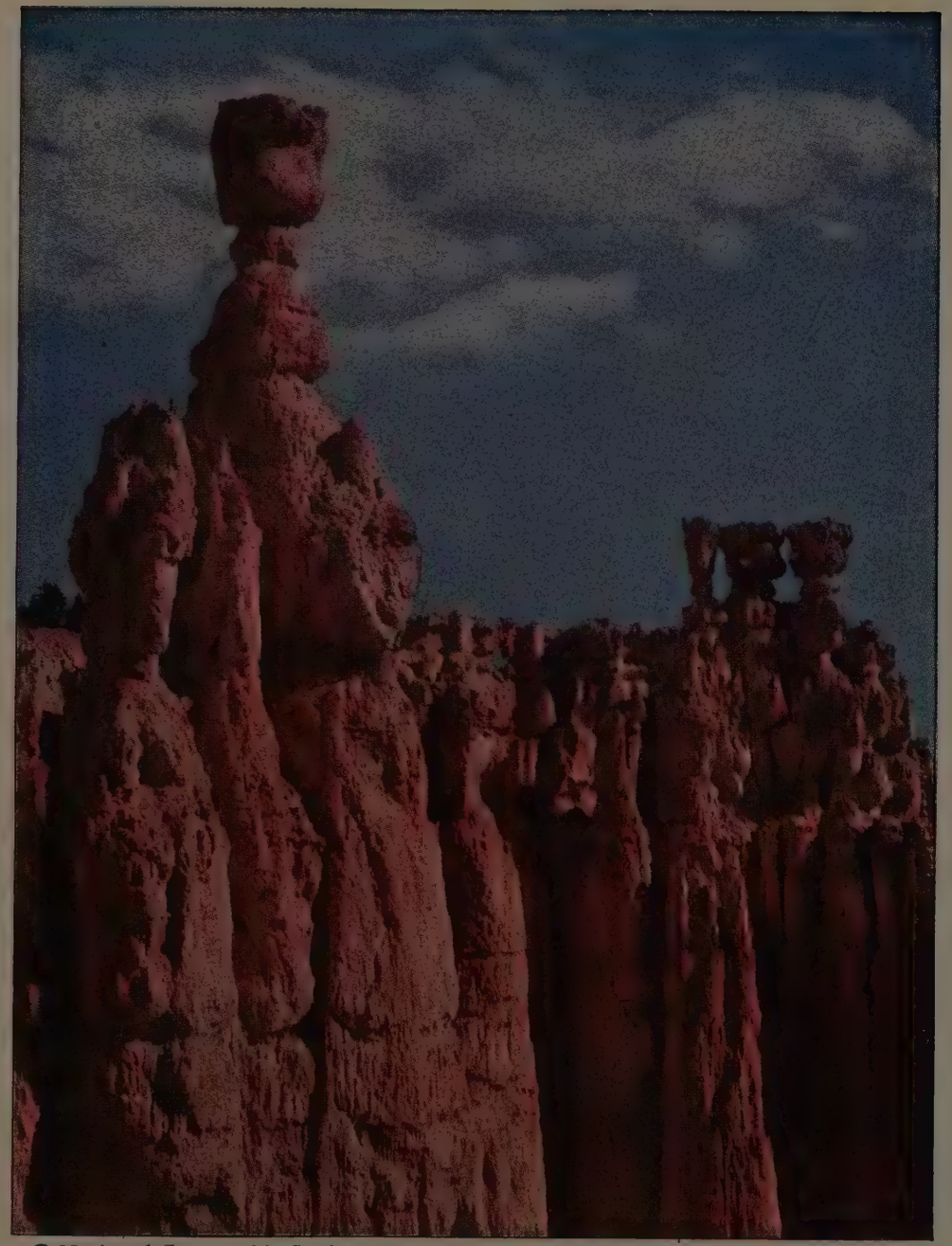
BRYCE CANYON IN SOUTHERN UTAH, VIEWED FROM THE RIM

The chasm discloses a vision of fairylike, filigreed lacework of stone, suffused with colors of endless variety.

© National Geographic Society Natural Color Photographs by Fred Payne Clatworthy

UTAH'S CANYONS RIVAL THE RAINBOW

So stupendous are the dimensions of these Western wonderlands that one loses all sense of proportion. The pink stone mass in the foreground is about the size of New York's famous Flatiron Building.



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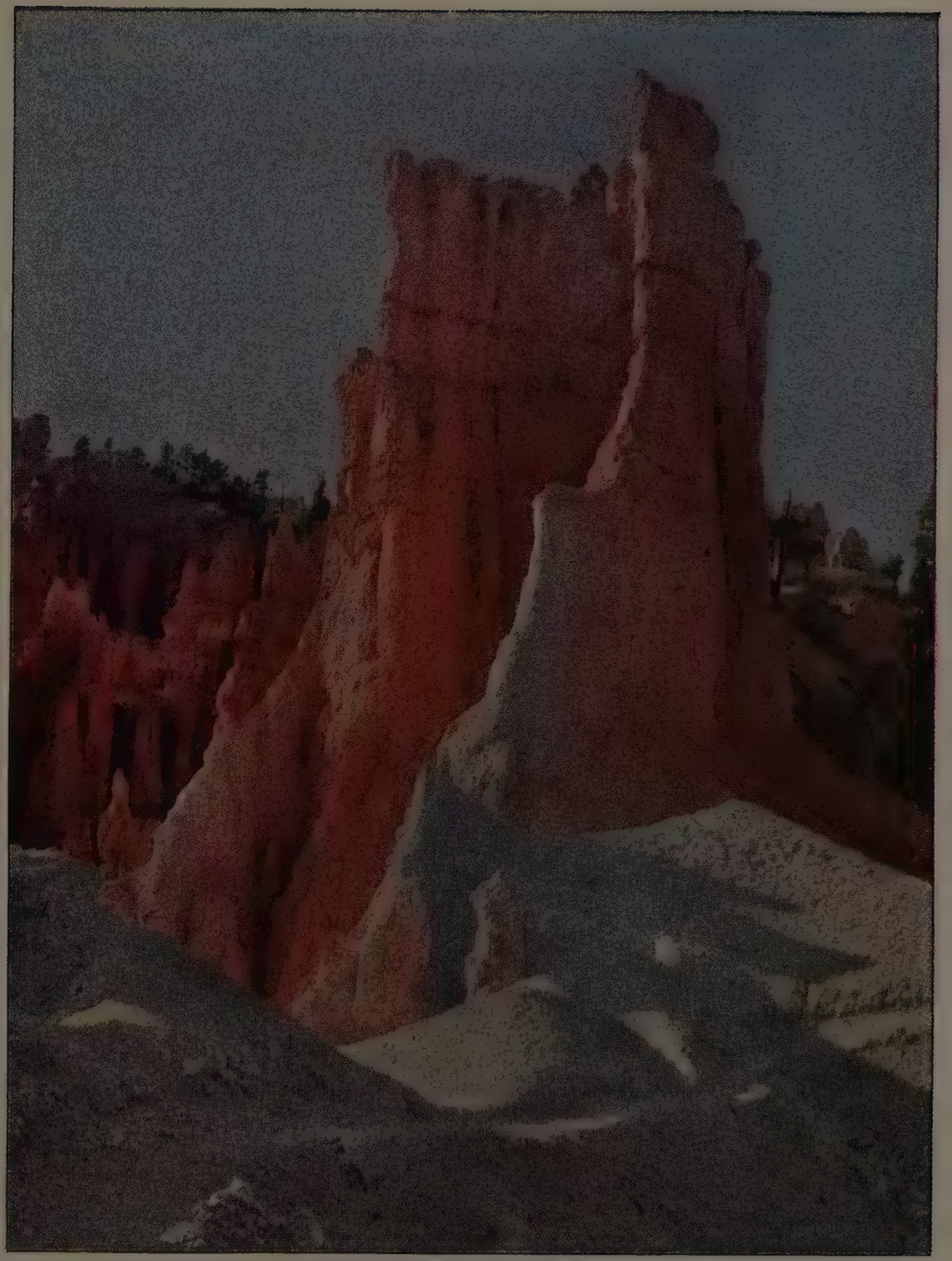
GIGANTIC TULIPS ON STEMS OF STONE

Nature has wrought grotesque figures of men, animals, trees, flowers, towers and temples in the rocks of Bryce Canyon.



Natural Color Photographs by Fred Payne Clatworthy

THE THRONE OF SOME TITANIC MAJESTY

A king who could sit comfortably on such a throne would have to be 200 feet tall.

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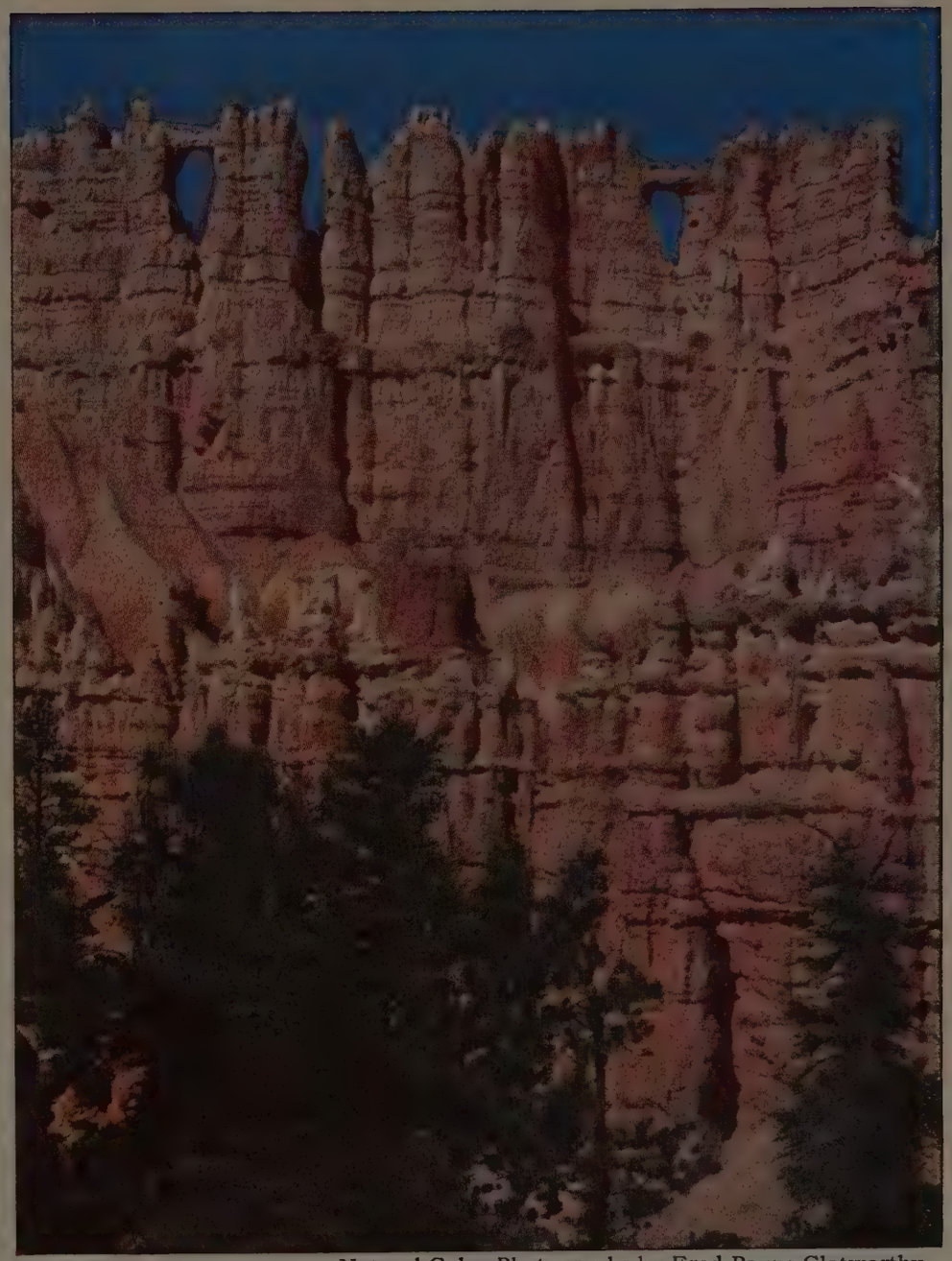


Natural Color Photographs by Fred Payne Clatworthy

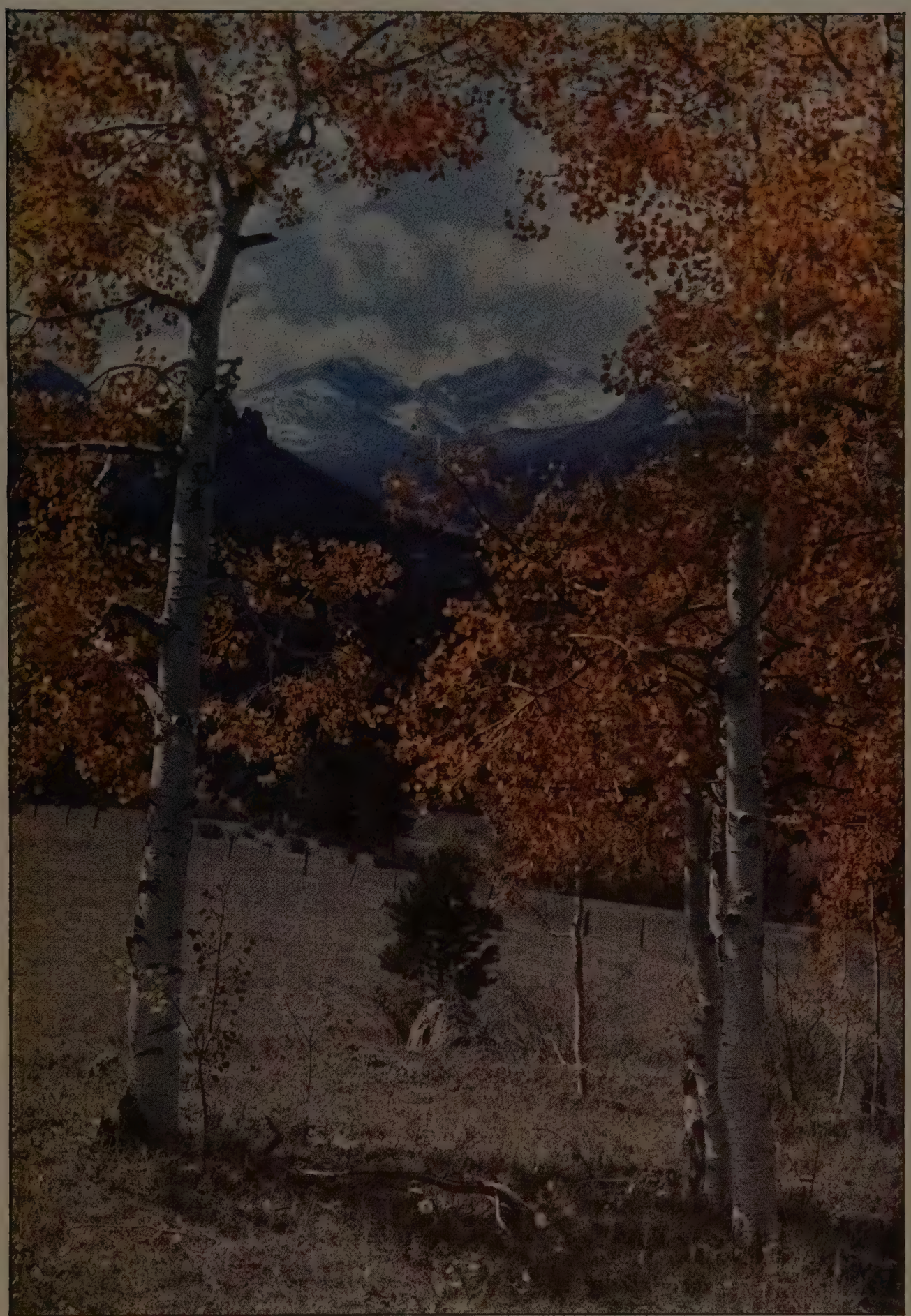
WORKS OF THE MASTER CRAFTSMEN OF EROSION

The forces of Nature have been at work in Bryce Canyon for countless æons and have carved multitudinous monuments from its sandstone walls. The formation at the right is known as the "Wall of Windows." Several of the apertures are high enough to accommodate comfortably a six-story building.

© National Geographic Society Natural Color Photograph by Fred Payne Clatworthy

"AND HUGE AERIAL PALACES ARISE, LIKE MOUNTAINS BUILT OF UNCONSUMING FLAME"

The views in Bryce Canyon appear like vistas in a dream city of some long gone and forgotten race. Many of its strange and fantastic formations are graven from a rock as white as pure Carrara, while others reflect the soft rose pink of the sunset glow.



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LONGS PEAK IS THE MONARCH OF ROCKY MOUNTAIN NATIONAL PARK

The 14,255-foot summit was first attained in 1868 and its ascent has since become one of the favorite expeditions of America's aspiring amateur mountain climbers. Several beautiful snow-born streams flowing from Longs Peak have carved canyons in the vicinity.

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Natural Color Photograph by Fred Payne Clatworthy

THE SIOUX WERE ONCE LORDS OF THE WEST

No other tribe resisted the oncoming tide of the white man's civilization with more determination than the brave and aggressive Sioux. A well-equipped people, both physically and mentally, they were for many years monarchs of the country that is now Minnesota, the Dakotas, and Montana. The ancestors of some of the chiefs pictured here planned and executed the campaign in which Custer's immortal

color pictures in the NATIONAL GEOGRAPHIC MAGAZINE, realize the great difficulty experienced in securing the originals. Natural-color plates mark the greatest advance in photography in fifty years; but color photography is still in its infancy. Not only does it require from 60 to 100 times the length of exposure of an ordinary photographic plate, precluding all motion work, but the fact that the plate is sensitive to all colors, red included, makes it extremely difficult to handle.

The color pictures in this issue represent many weeks of tramping along canyon rims and exploring canyon depths, and thousands of miles of travel over mountain ranges and across inhospitable desert wastes, during a period of many years, to discover suitable subjects.

The Grand Canyon of Arizona has been visited many times since my first trip, thirty years ago. I have camped beside the muddy Colorado at its bottom, walked down nearly all of its trails on both sides, followed the Tonto Trail over its plateaus, and walked hundreds of miles along its rim, from the old deserted Hance Trail on the east to the famous Bass Trail on the west (see Color Plates II, III, IV, V, and VI).

### MUNCHAUSENS OF THE GRAND CANYON

Hance and Bass, it will be recalled, prided themselves on being the two greatest prevaricators that ever lived in Arizona. John Hance once said to me: "You know, there are only three real liars at the Grand Canyon; I am one of them and Bass is the other two."

Hance said he once owned a fine Arabian horse that had a record for jumping. He believed that if he could find a suitable take-off the horse could leap the Grand Canyon. Finally a trial was made. When they reached the edge, the horse made a tremendous leap, but when halfway across, the rider saw his mount wasn't going to make it; so he tried to turn around and come back, but they fell 5,000 feet, and Hance added, "Only presence of mind saved my life, for I stepped off the horse's back just before we struck the bottom."

Hance repeatedly told us not to believe the erosion theory of the formation of the canyon, for "it was all bunk"; he and his partner, years ago, dug it and dumped the dirt where the San Francisco peaks are now located.

The Great American Desert, which comprised most of the country west of Colorado in our geographies forty years ago, has shrunk in successive editions until it now occupies a comparatively small area on each side of the Colorado River, in Arizona and California, and extends north into southern Utah. No other equal area in the whole world compares with this section in varied and gorgeous colors. It is bounded on the east by the Grand Canyon and the Painted Desert country, on the north by the "flaming canyons and jeweled amphitheaters of southern Utah."

My most strenuous trip in Zion National Park was the all-day climb up the old Mormon Trail to Observation Point, on the east rim. During this trip, partly on horseback and partly on foot, we were constantly encouraged by being shown where this or that horse had slipped off into the depths below. The view of Zion from a new trail to the west rim was taken before the trail was completed and it still provided many thrills (see Color Plates IX and XI).

Bryce Temple, in a more beautifully colored environment than any Grecian temple could ever boast, is one of the outstanding formations of Bryce Canyon. The author spent an entire day securing the autochrome, walking and climbing over a dozen miles, scaling almost perpendicular ridges to obtain the most effective view, and finally, in mid-afternoon, just the viewpoint desired was attained. It happened to be the summit of a hogback, nearly 500 feet above the floor of the canyon, which had been climbed once before the same day. The camera was a half mile from the temple and some 300 feet below, with a 500-foot gorge between. After a half-hour wait for the right light, the deed was done (see Color Plate XXII).

The desert flower and cactus pictures (Color Plates XIV, XV, XVI, and XVII) are the results of a thousand miles of rambles afoot and by camp car, up and down the Colorado and Mohave deserts, with Palm Springs, that incomparable oasis in the desert, as a base. During one of these picture trips I nearly lost my life in a Death Valley sandstorm. The man just behind me was smothered to death.

The Rocky Mountain National Park pictures (Color Plates VI, VII, and VIII) represent years of exploration of its most inaccessible canyons, lakes, and forests.

Photograph by Capt. Albert W. Stevens

THE POCKMARK ON THE FACE OF THE ARIZONA DESERT

Nothing like Meteor Crater has been discovered anywhere else on the face of the earth. Until recently no meteorite has been known to penetrate more than eleven feet into the surface of the earth. On the morning of July 30, 1908, natives of north-central Siberia saw a fiery body shooting across the sky and heard, a short time later, a thundering detonation. A Russian scientist succeeded only last year in locating, in the Yeniseisk district, a place where the forest had been blown down over an area 30 miles in diameter. At the center of devastation were many pits indicating the tombs of a number of large meteorites, but no holes comparable to Meteor Crater. An expedition has been organized to dig out the Yeniseisk meteorites.

# THE MYSTERIOUS TOMB OF A GIANT METEORITE

By William D. Boutwell

TO POSSESS a wonder of the world — the Grand Canyon, the Falls of the Zambezi, the Taj Mahal, or the Pyramids—is a proud estate for any nation. To possess a wonder from beyond the world is a still rarer privilege, although it meets with less acclaim.

In the Cape York meteorite, brought back from north Greenland by Rear Admiral Robert E. Peary, the United States has the largest single object known to have reached the earth from the heavens. To this meteorite can be added another remarkable prize legacy of the skies within the borders of the United States—the largest known tomb of a meteorite. The tomb gives evidence that a mass of metal thousands of times larger than the Cape York meteorite dropped from the skies near Canyon Diablo, Arizona.

### METEOR CRATER ATTRACTS AIRMEN

Because night overtook them, Lieutenant John A. Macready,* aviator, and Captain Albert W. Stevens,† air photographer, set down the airplane in which they were making a swing around the national parks in the West, on a dry lake bed at Winslow, near Canyon Diablo, Arizona. The inhabitants lost little time in informing them that Winslow was not just Winslow; it was Winslow, the "Meteor City." Furthermore, they learned that the unusual title was borrowed from the remarkable crater in the desert 20 miles away.

Early next morning the two flyers were off to see Meteor Crater. A few minutes' flight brought them to this astonishing hole. From the air it looked exactly like the enormously enlarged pit of a "dud" shell. The rim of white material thrown out of the cavity by the impact framed the hole against the purple and red surface sandstones that decorate the Painted Desert. Across the crater bottom the early morning sun threw a black scarf of shadow, producing a striking and significant resemblance to the stark craters that pockmark the moon.

In all the broad area visible from the plane, Meteor Crater was the most conspicuous object. It dominated the desert like a drop of ink on a blotter. Twenty miles east, columns of smoke marked the railroad yards at Winslow. Forty miles along the black etched line of the Santa Fe Railroad, in the other direction, was San Francisco Mountain, with its hood cloud and with Flagstaff nestling at its foot.

The railroad runs six miles north of Meteor Crater. Closer to the pit unrolls the taut white ribbon of the transcontinental highway, the Santa Fe Trail. Still nearer is the ragged-walled, zigzagging incision of Canyon Diablo.

Within a circle roughly described by a six-mile radius from Meteor Crater more meteoric iron has been picked up than has been found in any like area over the entire surface of the earth. Since meteorites are more significant than diamonds to the scientist, Canyon Diablo and Meteor Crater are well known to the scientific world, although they will be found on few maps.

To make a closer inspection of Meteor Crater, one must drive out or take the train as far as Sunshine Station. A boxcar forgotten by some hurrying freight is the station; there is nothing else—except sunshine.

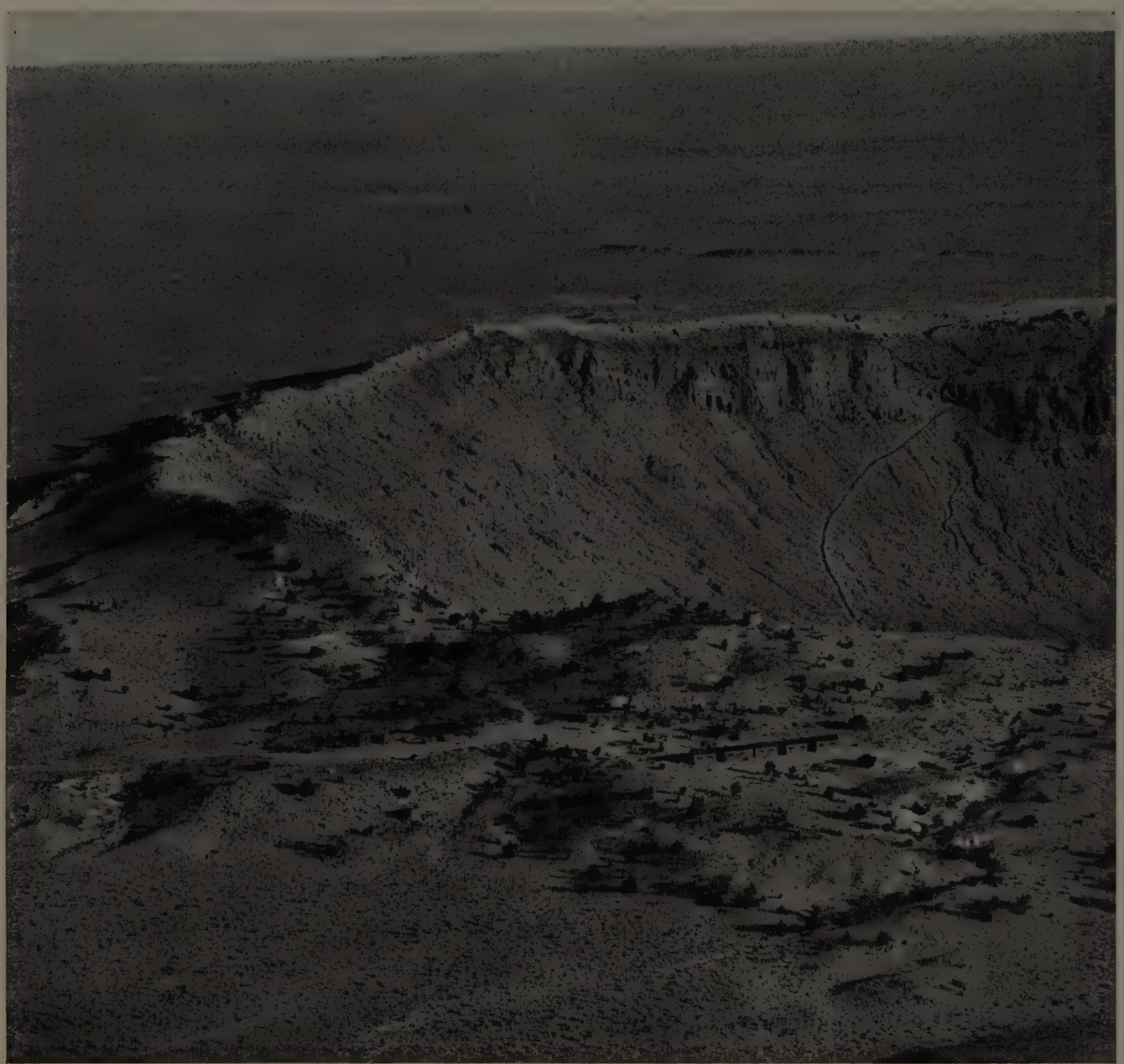
All alone in the midst of the desert south from Sunshine Station is a mound that at first sight appears to be a flat-topped butte, characteristic of the Southwest. Surmounting the center of the "butte" is a lonely derrick (page 728).

### THE CRATER IS 570 FEET DEEP

One must approach the mound, climb the half-mile slope which rises 150 feet, and actually stand on the crater rim to experience the awe this tomb inspires. The bottom of the crater is 440 feet below the natural level of the surrounding desert; 570 feet below the rim where the observer first sees the complete picture. The cliff at one's feet shelves down almost vertically until it reaches the slope of broken rock and sand torn off the walls by ero-

* Author of "The First Non-stop Flight Across America" and "Exploring the Earth's Stratosphere," in the National Geographic Magazine for July, 1924, and December, 1926, respectively.

† Author of "Exploring the Valley of the Amazon in a Hydroplane," in the National Geographic Magazine for April, 1926.



Photograph by Capt. Albert W. Stevens

AN AËRIAL VIEW OF SOUTH CAMP, AT METEOR CRATER

Men conducting recent drilling operations lived in the bunkhouses in the middle foreground. The white gash to the right shows where rain has cut a creek bed through the tons and tons of fine white rock flour pulverized by the impact. The first drilling for the meteorite was begun at the center of the pit, and the trail visible on the far side was made to bring down machinery and supplies.

sion. The sides all around are steep and ragged. A trip to the bottom, one rightly suspects, is an adventure of inverted mountain-climbing.

It is disturbing to revisualize the collision. One suddenly remembers the favorite problem of the physics teacher in high school. What will happen when an irresistible force meets an immovable object? Here is the answer! Almost!

### A FOOTBALL BOWL AWAITING A UNIVERSITY

The celestial shot that blasted the crater might have landed in some other place. On Manhattan Island the pit would be a considerable amphitheater. The main mass of skyscrapers on the lower end of the famous island could be dropped into the hole and only the Woolworth Tower would project prominently above the rim. What a pity some university doesn't locate beside it. Think of a bowl 25 times the size of Yale's!

Fully to appreciate the dimensions of this splash in stone made by a gigantic iron meteorite, one must walk around the rim. It is a three-mile tramp. The pit is 4,200 feet across, roughly four-fifths of a mile. All about are evidences of a terrific impact. The slopes of the rim are littered with crushed limestone and sand-

stone rock of all sizes. Where could white sandstone come from in a limestone desert? It is necessary to look within the crater again and see bared deep below, 300 feet or more, a belt of white sandstone. On the east and west slopes especially, the blocks tossed out have astonishing proportions. The largest is estimated to weigh more than 7,000 tons. One slab 10 feet thick leans drunkenly, like an old menhir, fully a half mile from the crater.

It is estimated that the meteorite displaced more than 200,000,000 tons of rock. In an instant it removed material equal to a quarter of the amount of material excavated in digging the Panama Canal.

The rock strata have been lifted up, wrenched, and wedged into seemingly impossible angles. On the south side the rock layers have been lifted almost vertical, and there they stand, grotesquely yet significantly, pointing toward the north.

### THE DIFFERENCE BETWEEN METEORS AND METEORITES

For thirty years, at least, Meteor Crater has been less a bowl than a football for scientists, professional and amateur, in the fields of astronomy, geology, physics, engineering, and even ballistics. Most authorities agree now that the crater is indeed the mark of a gigantic mass of meteorites. Probably it can be considered the tomb of a small dead comet.

The "accident" may have happened in this manner: A close-knit mass of nickel-iron, débris of a burned-out comet, came bowling along the elliptical course around the sun which it once traveled in a more brilliant fashion. Its route happened to coincide with that of the earth—a rare circumstance, indeed. Some hundreds of miles from the earth the comet may have snagged itself in the gravity net of the planet. The mass of iron swung in, traveling probably between 25 and 40 miles *per second.* Our atmosphere began to put on pressure to reduce the meteorite's celestial momentum to earth's traffic laws. Terrific speed created tremendous friction. Rich oxygen in the earth's atmosphere blowtorched the iron. The dead comet shot downward glowing like a brake shoe.

Earth's deep air cushion of atmosphere was unequal to this Juggernaut of metal, with a diameter variously estimated at from 300 to 500 feet and a minimum weight of a million tons.

Supersunlight blazed down on desert and mountain for a moment; then plain and peak shook with a dull, earthquaking thud. Into the air billowed a cloud of rock dust. Explosions rent the cloud. Jets of steam shot like geysers through it. Dust billowed again and the wind swept it far abroad. Clearing air exposed a great circular pockmark in the grassless desert.

While few incidents in Nature are more dramatic than the arrival of a meteor, there are few objects of less dramatic appeal than a meteorite. A meteorite is a meteor come to earth. Meteors pencil the calm of a starlit sky with streaks of light. Their fire rises quickly to crescendo and dies. Their usual fate is to perish in the blaze of their own histrionics. Some escape the clutches of gravity and dash back into the black alleys of the universe once more. Only occasionally does the end of a meteor's arc touch earth, and when some person finds the "pot" of iron or stone it is always a hideous black thing seared by the fires of friction. It is hard to believe that the dark-brown, misshapen lumps one sees in the museums carrying the label "meteorite" are the glorious night riders of the heavens.

Visitors to the American Museum of Natural History, in New York, approach that hall of wonders for the first time with a variety of expectations. They think, perhaps, to walk in upon a collection of thick-hided prehistoric animals.

Some hope to meet at the door the stuffed representatives of the modern animal and bird kingdoms. It is with considerable surprise, therefore, that nearly everyone enters the large elliptical reception hall, the place of honor, to see not a diplodocus, not bears or birds, not flowers, not Indian families in wax, not gems or beautiful stones, but a score of white pedestals, on each of which is a rusty, weathered, meteorite mass—a meteorite collection.

To the left of the entrance is Peary's Cape York mass, reigning monarch of meteorites. Yet one must have something of the scientist's love of abstract facts to work up any enthusiasm over this prize. It is a pitted mass about as large as an old-fashioned concert grand piano. But no pair of piano movers could budge it, since this meteorite is solid nickel-iron and weighs 36½ tons. A view of it does help

WHERE SOLID ROCK FLOWED LIKE WHEAT: THE OUTER SLOPES OF THE CRATER

Hopi Indians regard Meteor Crater with superstitious awe. Members of the tribe come periodically to obtain the powdery white rock flour from the outer slopes for use in religious ceremonials. Rock flour consists of grains of sandstone pulverized by shock (see page 729).

Photographs Courtesy U. S. Geological Survey

THE THREE-MILE PATH AROUND THE INNER RIM LEADS OVER BROKEN ROCK

Minute diamonds have been found in carbon pockets within the meteorites of Meteor Crater. Note the angle at which these rock strata have been propped up.

Photograph Courtesy U. S. Geological Survey

WHERE MOUNTAIN CLIMBING IS INVERTED: THE FACE OF THE RIM

Dark-red iron stains in the white rock identify meteoric iron within the crater. Digging usually discloses a badly rusted object called a "shale ball," the nucleus of which is nickel-iron. Twenty-nine of the 90 known elements, which are Nature's building blocks for water, land, and air, have been found in meteorites. The fragments from the Meteor Crater region contain 93 per cent iron, 4 to 8 per cent nickel, and carbon, phosphorus, cobalt, sulphur, and silicon.

one appreciate that gash in the desert near Winslow. Opposite stands one of the largest meteorites picked up in the vicinity of Meteor Crater, a roughly spherical blob of metal about the size of a large medicine ball.

### MYSTERY STILL SURROUNDS THE CRATER

Meteor Crater itself holds an audience better than the museum pieces, for its story is still overlaid with mystery. The bold evidence of the meteorite's arrival is spread for any eyes. Samples of it are scattered by the ton on the surrounding plain, where Winslow residents hunt them on a holiday much as boys search for Indian arrowheads. The dimensions of the mass have been figured by experts in ballistics.

Much money has been spent to drill holes and tunnels for this meteorite. In 1922 drillers struck something hard that

Photograph Courtesy U. S. Geological Survey

THE INSIDE OF THE CUP

Wind and rain have carried down dust, sand, and rock, so that Meteor Crater is not nearly as deep as it once was. Near the very center of the bowl, there is a slight eminence which may correspond to the cones which appear in the center of so many craters on the moon. Fast photographic studies of water drops have revealed a momentary reaction following the initial impact, in the course of which the center lifts up at the same time the encircling wave starts spreading. Some scientists think that similar action occurred at Meteor Crater and on the moon, where, however, the material raised up in the center of the splash could not flatten out again.

seized their drill and held it. Yet no man can say for certain that the main mass of the meteorite is in such a place, at such a depth, and is of such and such size. The unraveling of this mystery is a real challenge, for its solution would mark a red-letter year for science.

Hunting for the body of the meteorite began in 1906. The history of these operations and the results have been reported in brief as follows: A shaft was sunk directly in the center of the crater, where there had been a small lake bed at one time. Quicksand made it impossible to continue the shaft; so the crater floor was drilled at various other points. Iron-stained sand was the only product of this work.

Then geologists began to examine the crater walls more in detail. They observed that the tilted angle of the rock strata varied. On the south side it was raised nearly 90 degrees; on the north side no more than 5 degrees from the horizontal. They noticed that the tilt was progressively greater on both sides from north to south; also, that a whole 2,000-foot sector of the southern wall was lifted vertically about 100 feet. From this and other evidence the conclusion was reached that the mass of the meteorite struck from the north at an angle, crashed through the limestone and sandstone, and imbedded itself in a harder red sandstone at a point under the south wall of the crater.

The present derrick was erected on the south rim, therefore, and drillers recommenced work in 1920. Shattered and torn rock made the work difficult. At 300 feet the drill was lost. No amount of fishing could retrieve it. So a drift shaft more than 300 feet long was dug in the inner wall of the crater to get the drill.

A surprising discovery was made when the laborers completely cut through the slope of rock débris and reached the actual rock wall. Fast in the wall they found

Photograph from Mount Wilson Observatory

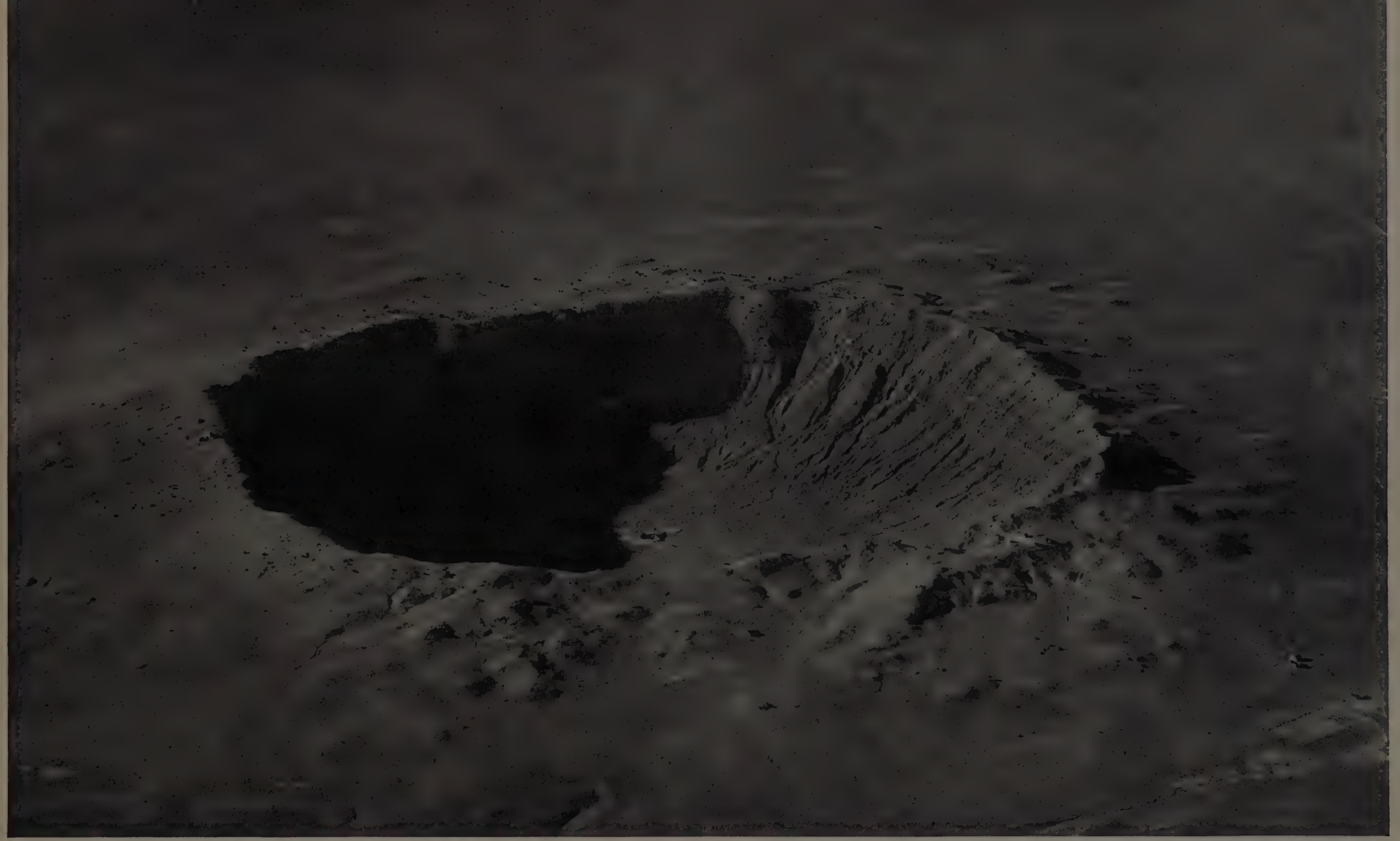
THE SCARRED FACE OF THE MOON SEEN THROUGH A 100-INCH TELESCOPE

Strong evidence supports the theory that both Meteor Crater and the craters of the moon are tombs of meteorites. Copernicus, one of the largest of the lunar craters, is 55 miles from rim to rim. More than 30,000 craters have been counted on that hemisphere of the moon which is turned constantly toward the earth. Thousands of them are larger than Meteor Crater.

Photograph Courtesy U. S. Geological Survey

CRATERS MADE BY A MUD BALL THROWN INTO A MUD CAKE

When first the theory was advanced that the crater near Winslow, Arizona, was the mark of a meteorite, physicists looked to it for an interpretation of the craters on the moon. The objection that moon craters showed no glancing blows immediately presented itself, but Dr. Grove Karl Gilbert proved with mud balls that an object thrown obliquely will make a hole similar to that made by an object descending vertically.



Photograph by Capt. Albert W. Stevens

THE GRAVE OF THE METEOR SEEN FROM AN ELEVATION OF 5,000 FEET

From rim to rim, Meteor Crater measures four-fifths of a mile. It is 570 feet deep. Millions of tons of stone were pulverized and splashed out, creating the numerous mounds encircling the crater. The specks on the left edge are stone blocks weighing thousands of tons (see illustration, page 730). When this view was made the airplane was flying northwest of Meteor Crater, and was, for the moment, on almost the same line and angle from which the meteorite is supposed to have struck. A drilling derrick surmounts an upraised sector of the far side, beneath which the main mass of nickel-iron is believed to have buried itself to a depth of more than 1,300 feet.

two shale balls consisting of oxidized meteoric iron. It is thought that following close upon the heels of the main body of the little comet was a "tail" of smaller pieces of iron, some of which lodged against the crater wall, where the drift shaft exposed them, and some of which distributed themselves broadly on the surrounding plain.

### THE DRILL IS LOST AT 1,376 FEET

Once the drill was recovered, the hunt for the iron mass began again. At 1,000 feet evidences of iron stain began to show. At 1,200 feet the drill went through powdered iron like that found around rusted meteorites discovered in the near-by desert. By the time the boring reached 1,300 feet the sludge often showed 50 per cent nickel-iron.

On August 11, 1922, at 1,376 feet the drill lodged in something hard and solid. It would not budge. Drillers tried all the tricks of oil-field fishing on the tool. Dynamite was exploded deep in the hole. All to no avail. The working had to be abandoned. Probably the goal of 18 years' effort was attained. But the condition of the iron and the amount of it there remain a mystery.

Although thousands of pioneers passed over the Santa Fe Trail within a few miles of Meteor Crater, the uniqueness of this world wonder escaped notice until Grove Karl Gilbert, the geologist, suggested the meteorite theory in 1895. Scientists were at first loath to believe that a meteorite blasted the crater. No other meteorite has been known to penetrate more than 11 feet in the ground. Most of them go no farther than a few inches, owing to their small size. In Norway one hit a frozen lake and bounced along without breaking the ice. In Sweden another fragment bounded on a housewife's washing without tearing or scorching the linen.

While Meteor Crater has no brothers on the face of the earth, probably there are thousands of similarly blasted craters within sight of everyone. That is a paradox which can only be explained with a telescope. Some bright moonlight night look at the man in the moon through a telescope and you will find that his shining face is badly pockmarked. More than 30,000 craters have been counted on the hemisphere which the moon turns constantly toward the earth. There is very strong support for the belief that all of them, like Meteor Crater, are tombs of meteorites. They may record far greater impacts than Meteor Crater. One of the largest is Copernicus, 55 miles across (see page 727).

The pitted face of the moon may be a model of what the earth once looked like, and perhaps what the earth might look like to-day had it, like the moon, no atmosphere to serve as a protective cushion.

Since the moon has no atmosphere and no rainfall, it has no protection and no erosion; so it has been unable to cover up the scars of celestial battering. Our sun and planetary system, physicists believe, were born out of the wreckage of an older system. Mars, Jupiter, the earth and all the rest are supposed to be picking up fragments of that ancient system in the form of meteorites. Of course, the chief accretions came when the planets were young; so it is assumed that the moon's meteorite scars are very old indeed. On our planet, sediments, rock upheavals, sinkings, and weathering have smoothed out any pits.

Evidence of tremendous shock is everywhere to be found in and around Meteor Crater. Nothing is more eloquent of collision than the tons upon tons of fine white sand in and out of the crater. On the slopes it seems to have flowed like wheat in a grain elevator. This rock flour, almost as soft and fine to the fingers as talc, will pass a two-hundred-mesh screen. A microscope shows the grains to be shattered bits of larger pieces. In the powder have been found quartz grains of the sandstone still whole, but cracked through and through by shock. If the pressure of a penknife blade is brought down upon the grain it breaks into pieces identical with the bits of rock flour.

### THE HOPI LEGEND AND A WILD INDIAN

The use of the pure white rock flour in Hopi religious ceremonies links the crater with a legend current in that tribe. Three of their gods, the Hopi believe, came down from the clouds onto the desert. One made his abode in Meteor Crater and the other two some distance north. Acting on the hint of the legend, search has been made in the region north of the railroad. The other two "gods" may have been smaller attendant meteorites whose tombs have not been located as yet.

Photograph Courtesy U. S. Geological Survey

A PEBBLE FOR CYCLOPS

On the eastern extremity of the rim of Meteor Crater stands the largest of the limestone bowlders tossed out. Huge rocks are found half a mile from the crater (see, also, text, page 723).

That Meteor Crater should have a place in the legends of the Hopi indicates a fairly recent origin. Geological study confirms this point of view. The pit cannot possibly be younger than 700 years, because cedars cut on the rim show that number of annual rings; but the weathering on the rock thrown from the crater shows that it is probably not older than 5,000 years.

The religious significance of the meteorite to the Hopi finds interesting parallels elsewhere. The sacred stone in the Kaaba, at Mecca, which all Moslems hope to kiss, is a meteorite. It was considered sacred long before Mohammed brought new importance to the shrine. Meteorites have also been found in the temples of the Aztecs in Mexico. One was discovered in a cliff-dwelling in Colorado. Several stones kept in Greek and Roman temples were probably meteorites.

One of the oldest meteorites which has been preserved through the centuries is the "Bewitched Burgrave" of Ensisheim. One month after Columbus discovered America a 300-pound meteorite fell near this Alsatian town. The superstition got about that the ball of iron was really a late tyrannical official of the neighborhood who had been turned into iron as punishment for his cruelty. The visitor to Ensisheim to-day will be shown the "Bewitched Burgrave" hung from the rafters of the old town hall.

An ugly meteorite fragment from Meteor Crater is as vital to the scientist's theory of the unity of the universe as the black iron in the Kaaba is to the religious concepts of Islam. The scientist's spectroscope tells him that the earth is made of the same stuff as the stars; his telescope reports that the earth's motions are in tune with the stars, sun and planets; but a meteorite is something that a scientist can take in his hand and examine. He can put in his test tube this piece of matter fallen on the Arizona desert. He can compare its minerals with minerals of the earth. Then he can say that the stuff of the stars is the stuff of the earth; and thus a meteorite helps to prove that every particle fits into a single plan which we are learning to understand.

# HOLIDAYS WITH HUMMING BIRDS

By Margaret L. Bodine

*With Illustrations from Photographs by the Author*

THE porch of our summer home in Maine is only 11 by 13 feet, quite in proportion to the Humming Birds which spend so many satisfying hours there. It is a second-story affair, bounded on two sides by the walls of the cottage, which is built on a bank. A clematis vine grows there in profusion, and on the wide railings are flower-boxes, which first made this nook known to our winged visitors. However, the flowers are not the secret of the porch's attraction for them, but miniature bottles, about two inches long, covered with some bright-hued material and filled with sugared water.

These bottles are fastened among the blossoms and are speedily discovered by the Humming Birds. Once found, there are few daylight hours from the middle of June till September when at least one is not there. Sometimes as many as eight are feasting at a time.

On the day after our arrival at our summer home last year we put the little bottles out, and in less than ten minutes the first Hummer came, drank, and perched.

### HUMMING BIRDS HAVE "TELEVISION"

The Humming Bird's powers of vision are marvelous. One of the little mites, which we discovered for the first time with field glasses, sitting on a branch of a tree several hundred feet from the porch, watched us from there when we filled the bottles and was at the tip of the medicine dropper which was used for this purpose, before we were through. This happened very often, and, as much of her time was spent on the same twig of this bough, we felt that her nest was probably near by. But the tree was a very tall one and it was not possible for us to prove it.

There is more individuality in birds of all species than is generally realized. The marking and shape often vary, but more especially do their actions differentiate the members of one family, and for this reason we were able to recognize certain Humming Birds whenever they came to see us. "Crazy Jane" is an example. A friend named her because of her habit of invariably drinking from the bottom of a bottle, where the overflow sugar and water ran down; never from the top, as would the average bird (see page 736).

One was quite an acrobat, clinging to the bottle with its feet and bracing itself with its tail while it drank.

### ANY BRIGHT OBJECT AROUSES CURIOSITY

Doubtless what seems to be curiosity in Humming Birds is in many cases a search for food, which consists largely of insects caught in the air and of the nectar sucked from flowers. The tongues of these birds are long and tubular, and they extract the honey easily from such blossoms as the honeysuckle and the trumpet vine. They dine on many other favorites, such as the bee balm, larkspur, phlox, gladiolus, rose, and clematis.

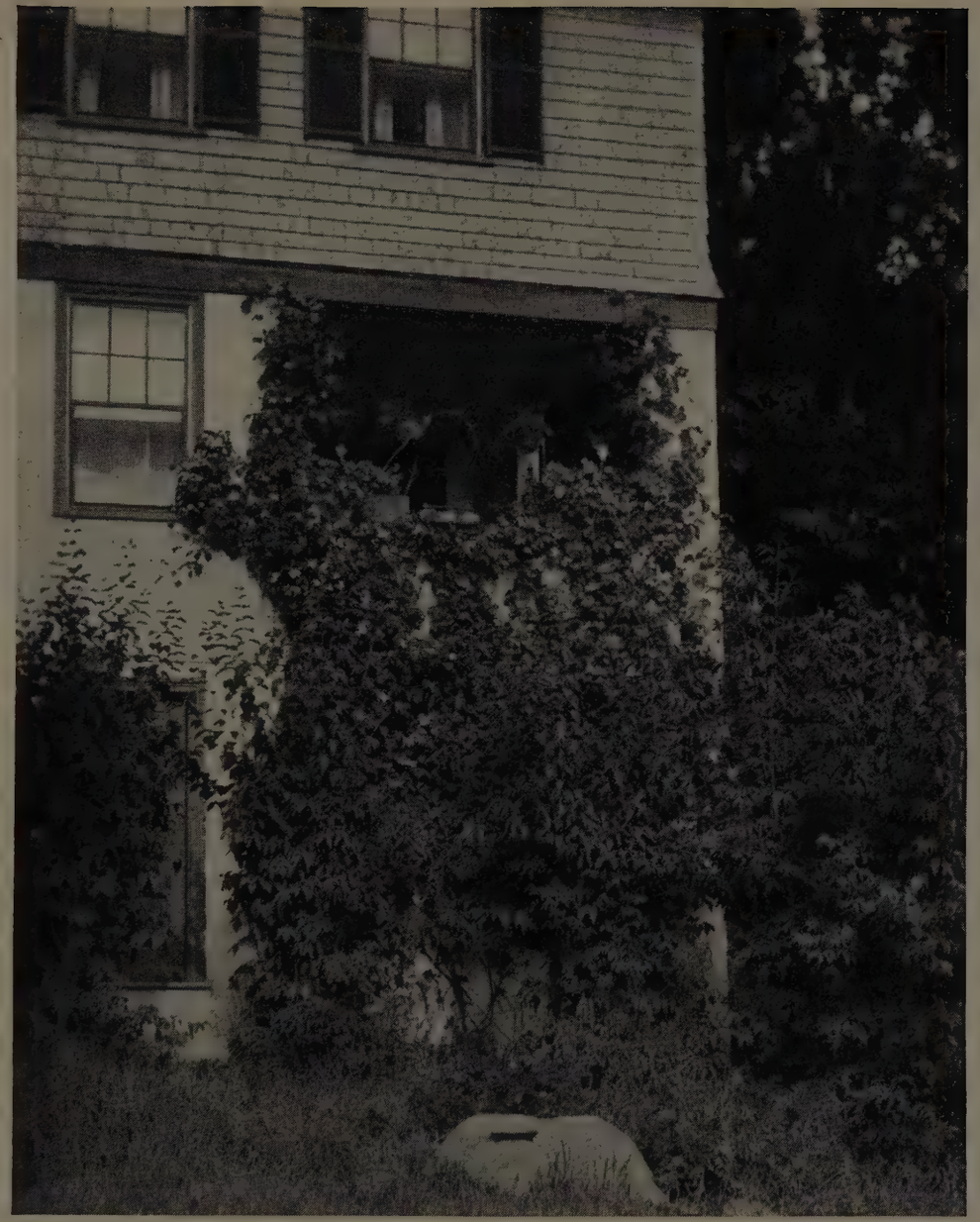
The Hummers investigate all bright objects on the porch: a red film box; one's purple sweater, in which the long bill is poked vigorously; they poise in front of the camera's lens or close to one's face, apparently studying it; or peer into each seed-cup of the birds' merry-go-round.

The merry-go-round is a successful device invented to circumvent the red squirrel, which stole the seed from an ordinary hanging tray that was provided for other varieties of feathered guests.

One day there was a male Purple Finch in our black birch tree close by the porch, brilliant raspberry-colored in the sun, which was shining brightly on him. A young Hummer, evidently mistaking the Finch for a sweet flower, darted at him and gave him repeated jabs. The Finch, appearing much bored, moved from spot to spot and finally flew away.

Our Humming Birds have certain favorite perching places: on the handle of a fern basket; the highest point of a wishbone-shaped root, where the larger birds land when coming to us, and in the tiny swings which are made just wide enough for them to alight without brushing their outstretched wings.

One afternoon, when we returned after an absence of several hours, we found



A RENDEZVOUS OF THE TINY FEATHERED FOLK

As many as eight Hummers at one time have visited this porch of a summer cottage in Maine. Other birds, chipmunks, and flying squirrels have also been attracted to its clematis-covered precincts to be "shot" by a camera (see text, page 738).

A LILLIPUTIAN BATTLE ROYAL

Nothing on wings can invade the domain of a Humming Bird with impunity. Larger birds usually forsake the field when he attacks, but bumblebees are not so discreet or else are more intrepid, for they frequently dispute the issue (see text, page 736).

BIRDS OF MANY KINDS ENJOY THE HOSPITALITY OF THE AUTHOR'S HOME

If provided with food and drink, or shelter and sanctuary, they will soon come to be on intimate terms with their benefactors. Note the Humming Bird drinking from a bottle attached to a twig on the right (see text, page 731).

A YOUNG DANDY PREENS HIS FEATHERS

Neatness is a characteristic of these birds, and after one of their frequent combats the victor almost invariably flies back to the precise perch he occupied before the struggle, and there rearranges his disordered plumage with great dignity (see text, page 738).

"GLITTERING FRAGMENTS OF THE RAINBOW"

The iridescent feathers of the Ruby-throat flash in the sunlight with many of the colors of the rainbow. The multifold hues of the Hummer's plumage are due not to the presence of coloring matter in the feathers, but to the manner in which rays of light are refracted by the peculiar feather structure. In this species the underparts of both male and female are soft gray, the head and back an iridescent green. Only the male has the brilliant metallic red throat.

THIS TINY FLYER IS EQUIPPED WITH REVERSE GEAR

Although the Humming Bird is easily capable of 60 miles an hour, speed is not the only remarkable feature of its flight. It is the only land bird that can really fly backward and one of the few that can rise straight up into the air like a helicopter.

LICKING SWEETENED WATER FROM A FRIEND'S FINGER

Until very recently it was not known how to keep these little sprites in captivity. Invariably, in less than two months, they starved to death, because of a lack of their regular insect food and despite an abundance of sugared water and flower nectar. A short time ago a substitute diet was discovered by two amateur ornithologists, one in New England and one in Texas, and by their methods birds have been kept captive successfully for as long as two years.

"CRAZY JANE" ENJOYS AN OVERFLOWING BOWL

This particular Humming Bird won her sobriquet because she insisted on drinking the overflow of syrup from the bottom of the bottle, where it ran down on the outside, instead of from the top, as did all her fellows. The other bird in the picture is a Purple Finch, and, although several times the size of the Hummers, will make way for them if attacked.

four Humming Birds waiting for us—a real, if not disinterested, welcome. A sight that brings a smile is that of a tiny Humming Bird perched with much dignity beside a stately Waxwing, a portly Robin, or in the midst of a flock of Purple Finches.

### AN INTREPID TRAVELER

Wilson, the ornithologist, writing in 1810 of the Humming Bird and its migration, which is often from Central America to Canada, says, in the quaint phraseology of that day:

"As it passes on to the northward, the wonder is excited how so feebly constructed and delicate a little creature can make its way over such extensive regions of lakes and forests, among so many enemies, all its superiors in strength and magnitude. But its very minuteness, the rapidity of its flight, which almost eludes the eye, and that admirable instinct, reason, or whatever else it may be called, and daring courage which Heaven has implanted in its bosom, are its guides and protectors."

Hummers are among the most fearless of all birds, despite their size, and are quite able to hold their own in the avian world, where they are treated with wholesome respect. They will attack Hawks,

A BABY HUMMING BIRD, WITH OUTSPREAD WINGS, BEGGING TO BE FED

Like most young birds, baby Hummers have an appetite quite out of proportion to their diminutive size. The parents feed them by regurgitation, first swallowing and partially digesting the food themselves. To the uninitiated, the old birds appear to be attacking their offspring when they are in reality supplying them with predigested nourishment (see text, page 739).

DINING WHILE RECLINING—A RARE POSE

While our well-known Ruby-throat varies from three to four inches over all, in the West Indies there is a species only 2¼ inches in length; on the other hand, among the high Andes one variety of Humming Bird is as large as our unwelcome Starling. A long bill is a feature common to Hummers, and in one species the bill is longer than all the rest of the bird.

WHEN ADULT MALES ARE ABSENT, THERE IS PEACE ON THE PORCH

A syrup of sugar and water is placed in tiny bottles, wrapped in bright-hued material. The color excites the Hummers' curiosity, and it is not long before their long, tubular tongues are sucking up the fluid.

Eagles, and Crows, and I have a firm conviction that if conflicts were to occur between a Humming Bird and the Great Blue Heron, which sometimes comes to our near-by harbor, the vanquished one would never be the Hummer.

### SOME INDIVIDUALS ARE EXTREMELY BELLICOSE

Observation of these small birds during the past five summers does not lead us to the conclusion that they exemplify the Christian virtue of meekness to any marked degree. For temper, pure and simple, they surely have no equal. One of our Hummer visitors apparently was frequently thrown into a violent rage by the approach of another. With tail wide spread, the white-edged tail feathers giving the effect of a petticoat showing beneath a skirt, and fairly shrieking, it would dart at the newcomer, striking viciously with its rapierlike bill.

Some days there are hours when one couple will be fighting in the air, sailing close together, then suddenly separating, dashing at each other and striking with terrific force. We hear the sound of bill striking bill, or the thud of body against body, and are always fearful of finding a dead bird below.

Such battles may account for the small dark marks which we see on the necks and breasts of some of the birds. After each duel the victor invariably returns to the exact spot which it had left, breast heaving, but with triumph written on every feather, an illustration for a "Winged Victory" (see page 734).

There have been several red-letter days in our Humming Bird summers. One of these was early in August, when there seemed to be a veritable swarm of birds on the porch. There was a constant buzzing, creaking, and squeaking, as our "boarders" darted across the porch to drive others from their perches. We watched spellbound. It was difficult to count them and we could not be sure that there were more than eight at any one time, though the number seemed much greater.

### THE HUMMING BIRD FAMILY LIFE

Another day worthy of remembrance was that on which the first baby Humming Bird was brought to the porch. It was

the most diminutive ball of feathers we had ever seen and was discovered clinging tight to the clematis vine. Soon we found its twin being fed by the male Ruby-throat in the birch tree, though it is often stated that the father forgets all family cares after the nest is completed.

The nest itself is very beautiful. It is an inch or less in diameter and the same in depth, and is lined with milkweed and plant down. Usually the tiny structure is saddled to the limb of a tree and fastened securely with cobwebs.

Nests have been found on cedar boughs, beech, elm, spruce, and fruit trees; on vines, blackberry briers, the stalk of a weed; in bushes or even attached to a hammock. Indeed one may be found almost anywhere, though the parents conceal them so effectively that they are among the most difficult of all bird homes to locate. There are invariably two eggs, pure white, and the time of incubation is slightly less than two weeks, the young leaving the nest in about the same length of time.

FIGHTING IS THE HUMMER'S FAVORITE SPORT

The usual technique of Humming Bird warfare is to grasp the antagonist firmly by the bill and then fall to the ground, beating the wings viciously. There the combatants roll and beat about until one gains the advantage. The vanquished frequently pretends to be almost dead until his adversary leaves him, when he is up like a flash and off in pursuit, to start the fight again. Despite their battles, the Hummers' strength is so slight that they seldom do each other serious injury.

The little ones grew unbelievably fast and came often to the porch, though for some time they were unable to drink from the bottles. The mother fed them, and the first time we saw her do it we were quite ready to notify the Society for the Prevention of Cruelty to Children. The baby crouched flat on the perch, squeaking as if in distress, and the bird hovering over it seemed to be stabbing it to death.

We thought an alien infant was being persecuted by one of our birds until we discovered that the little one was being fed by regurgitation, the predigested food being pumped into its stomach by its mother. Often the baby would cling upside down to the perch with bill wide open, begging to be fed (see page 737).

One baby bird with a yellowish tinge on throat and breast spent much time on a porch perch making its toilet, going carefully over each feather, preening and licking it with bill and tongue. Often one

GETTING READY TO SERVE A QUICK LUNCH IN APPROVED HUMMING BIRD STYLE

When feeding her young the Ruby-throat parent usually perches on the edge of the nest or on a twig beside the baby (see page 737), but sometimes she serves lunch while on the wing, balancing herself in the air in front of her progeny. Only a bird with the tremendously rapid wing beats of the Hummer could control its aërial actions well enough to accomplish this feat. The tail with its white "petticoat" feathers showing serves as a rudder and balancer.

sees the very long tongue, which is stuck in and out with great swiftness.

Several times a Hummer has perched quite calmly on a friend's extended finger, once running its tongue lightly along where sweetened water had been placed—the most gentle touch imaginable (p. 735).

One summer, for some inexplicable reason, no adult male Humming Bird was seen on the porch, although there were the usual females and immature males. We missed seeing the gorgeous red throats, but that was our most peaceful summer, with many photographic opportunities. The following and each succeeding summer we have had several males, who have appropriated the porch as a private club and have driven away with much fierceness all females and young birds. They have guarded the premises either from a perch on the porch or from a near-by tree and allowed no other Hummers to touch the sweetened water, whether or not they themselves wanted to drink.

The male is very beautiful, as he weaves his way back and forth before his lady-love in the mating season. She sits quietly on a twig as he sails slowly up and down, up and down before her.

Another pretty sight was that of a Hummer flying up the trickling stream of water overflowing from the bird bath on the railing, then settling down on a large leaf, spreading its feathers out and evidently enjoying the wet.

We have a vivid recollection of the first time we saw two Humming Birds sitting side by side on one of the porch perches. Audubon has called them "glittering fragments of the rainbow," and truly, as the sun shone dazzlingly on them, it was a charming picture.

A mother bird will allow one of her children to perch with her, but woe betide the intruder who attempts to share her resting place. It is an amusing and ludicrous sight to watch the parent bird take her stand on a perch and protect it against all interlopers. She herself will drink and

A HUMMER'S WINGS MOVE FASTER THAN AN AIRPLANE'S PROPELLER

So rapid is the oscillation that the wings of these feathered mites appear merely as a blur to the eye. By striking a note on a violin which exactly harmonized with that of the tone of a Hummer's wings, it has been found that the latter vibrate as much as 200 times a second. This is five or six times faster than the propeller of the famous *Spirit of St. Louis* revolves.

permit her children to do so, but flies into a fury at the approach of others, spreading her tail and wings wide, darting at them violently, and looking so formidable that only the bravest would dare try to stay near her for long.

### PROBLEMS IN PHOTOGRAPHING HUMMERS

Photographing Humming Birds provides sufficient difficulties to make it an interesting specialty, arousing one's sporting instinct. One does not like to feel an "inferiority complex" caused by a creature little more than three inches long.

A goodly proportion of the Humming Bird's life is spent on the wing, the very powerful muscles used in flying being attached to a strong and prominent breastbone. To try to match the speed of its wings with a camera's shutter furnishes no small amount of excitement and at the same time something of a problem. For this kind of work it has been found preferable to use a camera which enables the photographer to see his image on the ground-glass, and focus accurately up to the second of exposure.

When pictures of the Humming Birds are to be made, a small perch is fastened in the vines wherever the light is best—fortunately for the photographer the Hummers are great sun-lovers—and a bottle is placed close by. All the other bottles are temporarily removed in order to force the birds to the desired spot. Diaphragm and shutter are made ready and the photographer waits, and seldom has to wait long, for a pleasing pose. The perch is indispensable, for the birds love to rest between their long drafts.

Even when the bottle is almost entirely concealed in the vines, with the object of making a more natural-looking picture, the Hummers find it very quickly.

Frequently, owing to their excessively fast movements, a developed film reveals

BANDING A HUMMER IS A DELICATE OPERATION

This bird is one of the very few of its species that have been successfully banded (see its right leg). Indeed, so great are the mechanical difficulties in getting a suitable band and so delicate are the tiny legs that the bird-banding division of the U. S. Biological Survey rather discourages the practice of banding Hummers. The only banded birds of which the Survey has a record of their return to the bander are the three which have come back to the author's friend in Maine (see text below).

a surprise, as in one picture which resembled an irate parent holding the traditional birch rod, the baby cowering beneath the perch in terror. This was supposed to be a feeding picture.

### BANDED HUMMING BIRDS RETURN TO SUMMER HOME

An enthusiastic bird lover is a summer neighbor of ours. She lives at a near-by inn, where she has a unique third-story bird window, a feeding and banding station combined. There she has performed the extremely delicate operation of putting microscopic bands on a number of Humming Birds (see illustration above), and has succeeded in getting several back and checking them up as "returns," indicating that Hummers are constant to a locality.*

The game of attracting the Humming Birds has proved a most rewarding one, and the attempt to catch these diminutive creatures with lens and shutter on a photographic plate is an alluring pastime.

Pope says:

"Yet by some object every brain is stirr'd;
The dull may waken to a Humming Bird."

The writer, indifferent to the implication, is thankful for many joyful hours she has had because of this awakening.

* See, also, "Bird Banding, the Telltale of Migratory Flight," by E. W. Nelson, in the NATIONAL GEOGRAPHIC MAGAZINE for January, 1928.